

Use $2n$ for an even number.

Proofs (A)

Use $2n+1$ for an odd number.

Show that the statement " $n^2 + n + 3$ is prime for all positive integers n " is false.

$$\begin{aligned} 2^2 + 2 + 3 &= 4 + 2 + 3 \\ &= 9 \text{ which is not prime} \end{aligned}$$

Prove that the product of two odd integers is odd.

Let $2m+1$ and $2n+1$ be two odd integers.

$$\begin{aligned} (2m+1)(2n+1) &= 4mn + 2m + 2n + 1 \\ &= 2(2mn + m + n) + 1 \text{ which is odd} \end{aligned}$$

Prove that the sum of any three consecutive integers is divisible by 3.

Let k , $k+1$ and $k+2$ be three consecutive integers.

$$\begin{aligned} k + k+1 + k+2 &= 3k + 3 \\ &= 3(k+1) \text{ which is divisible by 3} \end{aligned}$$