

Algebra - Proof

Q1

Prove, using algebra, that the sum of two consecutive whole numbers is always an odd number.

(Total 3 marks)

Q2

Prove that $(3n + 1)^2 - (3n - 1)^2$ is a multiple of 4, for all positive integer values of n .

(Total 3 marks)

Algebra - Proof

Q1

Prove, using algebra, that the sum of two consecutive whole numbers is always an odd number.

Let n be any whole number
then next consecutive whole number is $n+1$

The sum of these is $n + n+1 = 2n+1$

Since 2 is not a factor of $2n+1$

$2n+1$ is odd

(Total 3 marks)

Q2

Prove that $(3n+1)^2 - (3n-1)^2$ is a multiple of 4, for all positive integer values of n .

$$\begin{aligned} & (3n+1)^2 - (3n-1)^2 \\ = & [(3n+1)(3n+1)] - [(3n-1)(3n-1)] \\ = & [9n^2 + 6n + 1] - [9n^2 - 6n + 1] \\ = & 9n^2 + 6n + 1 - 9n^2 + 6n - 1 \\ = & 12n \\ = & 4(3n) \end{aligned}$$

Since $3n$ is also an integer this is a multiple of 4

(Total 3 marks)