1. The nth even number is $2n$.

The next even number after $2n$ is $2n + 2$

(a) Explain why.

....

....

(1)

(b) Write down an expression, in terms of n, for the next even number after $2n + 2$

....

(1)

(c) Show algebraically that the sum of any 3 consecutive even numbers is always a multiple of 6

(3)

(5 marks)

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

(3 marks)

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

(3 marks)

4. Prove that

$$(2n + 3)^2 - (2n - 3)^2 \text{ is a multiple of } 8$$

for all positive integer values of n.

<u>(3 marks)</u>

***5.** Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers.

(4 marks)

6. Prove that $(5n + 1)^2 - (5n - 1)^2$ is a multiple of 5, for all positive integer values of n.

(3 marks)

7. If $2n$ is always even for all positive integer values of n, prove algebraically that the sum of the squares of any two consecutive even numbers is always a multiple of 4.

(3 marks)

8. Prove that

$(n + 1)^2 - (n - 1)^2 + 1$ is always odd for all positive integer values of n.

(3 marks)

9. Prove algebraically that the sum of the squares of any two consecutive numbers always leaves a remainder of 1 when divided by 4.

(4 marks)