GENMATHS RESOURCES

ALGEBRAIC PROOF

Task 1

1) Prove that for any positive integer n, $3n + 18 + n + 6$ is always a multiple of 4.

2) Prove that for any positive integer n, $5n^2 + 16 + n^2 - 4 + 6n$ is always a multiple of 6.

3) Prove that for any positive integer n, $16n + 5 + 4n + 25$ is always a multiple of 10.

4) Prove that for any integer n, $9n + 19 + 12n + 3$ is always one more than a multiple of 3.

5) Prove that for any positive integer n, $3(6n + 7) + 2(3n - 1)$ is always one more than a multiple of 6

Task 2

6) Prove that the sum of two even integers is always even.

7) Prove that the product of two odd integers is always odd.

8) Prove that $4n^2 + 4n + 1$ is always a square number, for all positive integer values of n.

9) Prove that $(2n + 1)^2 - (2n - 1)^2$, is always a multiple of 8, for all positive integer values of n.

10) Prove that $(3n + 4)^2 - (3n - 4)^2$ is always a multiple of 16, for all positive integer values of n.

11) Prove that the sum of two consecutive integers is always odd.

12) Prove that the sum of three consecutive integers is always a multiple of 3.

13) Prove that the difference between two odd integers is always even.

14) Prove that the sum of two consecutive even integers is always even.

15) Prove that the difference between two consecutive square numbers is always odd.

16) Prove that the product of two consecutive integers is always even.

17) Prove that the square of any multiple of 3 is also a multiple of 9.

18) Prove that the square of any odd integer is also odd.

19) Prove that the square of any even integer is a multiple of 4.

20) Show that the difference between the squares of two consecutive integers equals the sum of those integers.

21) Prove that the sum of the squares of two consecutive integers is always odd.

22) Prove that $2(x^2 + y^2 + xy) - (x^2 + y^2)$, is a square number for all positive integer values of n.

Challenge

23) Prove that the difference between the cubes of two consecutive integers can be written as $(3n(n+1)+1)$

24) Prove that $n^3 - n$ is always a multiple of 6, for any positive integer value of n.

25) Prove that the product of two consecutive even integers is a multiple of 8.