Corbett maths

Algebraic Proof

Video 365 on Corbettmaths

Examples

Workout

Click here

Scan here

Question 1: Prove the following

(a) $(n + 7)^2 - (n + 1)^2 = 12(n + 4)$

(b) $(n + 1)^2 - (n - 3)^2 = 8(n - 1)$

(c) $(n + 1)^2 + (n + 5)^2 - (n + 9)^2 = (n + 5)(n - 11)$

Question 2: Prove the following

(a) $(n + 4)^2 - (n + 2)^2$ is always a multiple of 4 for all positive integer values of n.

(b) $(n + 10)^2 - (n + 2)^2$ is always a multiple of 16 for all positive integer values of n.

(c) $(2n + 3)^3 - (2n + 1)$ is always even for all positive integer values of n.

(d) $(5n + 2)^2 - (5n - 1)^2$ is always a multiple of 3 for all positive integer values of n.

(e) $(2n + 9)^2 - (2n + 5)^2$ is always a multiple of 4 for all positive integer values of n.

(f) $(n + 2)^2 - (n - 2)^2 + 3$ is always odd for all positive integer values of n.

Question 3: n is a positive integer.

(a) Write an expression for an even number.
(b) Write an expression of an odd number.

Question 4: Prove the following

(a) The sum of any three consecutive integers is divisible by 3.
(b) The sum of any three consecutive even numbers is always a multiple of 6.
(c) The sum of two consecutive odd numbers is even.
(d) The sum of three consecutive odd numbers is always a multiple of 3.
(e) The sum of four consecutive odd numbers is always a multiple of 8.
(f) The sum of two consecutive integers is always odd.
(g) The sum of four consecutive integers is **not** a multiple of 4

Corbett maths

Algebraic Proof

Video 365 on Corbettmaths

Question 5: Prove the following

(a) Prove the product of two odd numbers is always odd.

(b) Prove the product of two even consecutive numbers is always a multiple of 4.

(c) The difference between the squares of any two consecutive integers is equal to the sum of the two integers.

(d) Prove the sum of the squares of any two consecutive even numbers is always a multiple of 4.

(e) Prove that when any odd integer is squared, the result is always one more than a multiple of 8.

Apply

Question 1: The first five terms of a linear sequence are 2, 7, 12, 17, 22

(a) Find the nth term of the sequence

A new sequence is generated by squaring each term of the linear sequence and then adding 1.

(b) Prove that all terms in the new sequence are divisible by 5.

Question 2: The first two terms of a fibonacci sequence are ***a*** and ***b***.

(a) Show the 4th term of the sequence is ***a+2b***

(b) Prove that the sum of the first 10 terms is equal to 11 times the 7th term.

Question 3: Cara writes down a 3-digit number where the first digit is greater than the last. e.g. 681

She then reverses the number to give 186.

Cara then subtracts this number from her starting number. 681 − 186 = 495

She then reverses her answer to give 594.

Cara then adds these number 495 + 594 = 1089.

$$\begin{array}{r} 681 \\ -186 \\ \hline 495 \end{array} \qquad \begin{array}{r} 594 \\ +495 \\ \hline 1089 \end{array}$$

Cara repeats this several times and always gets 1089 as her answer.

Prove algebraically that the answer is always 1089.

Answers

Click here