KumarMaths

Pearson Edexcel

GCSE Maths (9 – 1)

Past Exam Questions by Topics:

Algebraic Proofs.

1. Prove algebraically that the difference between the squares of any two consecutive odd numbers is always a multiple of 8

(3 marks)

2. Prove that the square of an odd number is always 1 more than a multiple of 4.

(4 marks)

3. n is an integer.

Prove algebraically that the sum of $\frac{1}{2}n(n+1)$ and $\frac{1}{2}(n+1)(n+2)$ is always a square number.

(2 marks)

4. The nth term of a sequence is $n^2 + 4$

Alex says

"The nth term of the sequence is always a prime number when n is an odd number."

Alex is wrong.

Give an example to show that Alex is wrong.

(2 marks)

5. Prove algebraically that the product of two odd numbers is **always** an odd number.

(3 marks)

6. n is an integer greater than 1.

Use algebra to show that $(n^2 - 1) + (n - 1)^2$ is always equal to an even number.

(4 marks)

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

(4 marks)

8. Prove that

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

for all positive integer values of *n*.

(3 marks)

9. Prove algebraically that

$$(2n + 1)^2 - (2n + 1) \quad \text{is an even number}$$

for all positive integer values of n.

(3 marks)

10. Prove that, for all positive values of n,

$$\frac{(n+2)^2 - (n+1)^2}{2n^2 + 3n} = \frac{1}{n}$$

(4 marks)

11. n is an integer greater than 1

Prove algebraically that $n^2 - 2 - (n - 2)^2$ is always an even number.

(2 marks)

12. Prove that $4x^2 - 8x + 7$ is positive for all values of x.

(3 marks)

13. Prove algebraically that the difference between any two different odd numbers is an even number.

(3 marks)

14. For any three consecutive whole numbers, prove algebraically that

the largest number and the smallest number are factors of the number that is one less than the square of the middle number.

(3 marks)

15. a, b, c are positive integers such that $a > b > c$.

N is the largest three digit number that has the digits a, b and c.
K is the smallest three digit number that has the digits a, b and c.

(a) Use algebra to show that the difference between N and K is always a multiple of 99.

(3)

(b) If $a > b$ and $b = c$ will the difference between N and K still be a multiple of 99?
Justify your answer.

....

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(1)

(4 marks)

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

(4 marks)

17. The product of two consecutive positive integers is added to the larger of the two integers.

Prove that the result is always a square number.

(3 marks)