THIRD SPACE LEARNING

GCSE Exam Questions

Algebraic Proof | Algebra

GCSE Exam Questions: Algebraic Proof

1) Prove that $(2n + 3)^2 - (2n - 3)^2$ is a multiple of 8 for all positive integer values of n.

(3 marks)

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

(5 marks)

GCSE Exam Questions: Algebraic Proof

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

(3 marks)

4) 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)

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GCSE Exam Questions: Algebraic Proof Answers

	Question	Answer	Marks
1)	Prove that $(2n + 3)^2 - (2n - 3)^2$ is a multiple of 8 for all positive integer values of n.	$4n^2 + 12n + 9$ **or** $4n^2 - 12n + 9$ **or** $-4n^2 + 12n - 9$ **seen** $24n$ $8(3n)$	**(1)** **(1)** **(1)**
2)	Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers.	Two consecutive integers written algebraically e.g. n **and** $n + 1$, **or** $n - 1$ and n, **or** $n + 1$ **and** $n + 2$ etc The difference between the squares of their two integers written algebraically e.g. $(n + 1)^2 - n^2$ **or** $n^2 - (n - 1)^2$ **or** $(n + 2)^2 - (n + 1)^2$ **etc** Correct expansion e.g. $n^2 + 2n + 1 - n^2$ **or** $n^2 - n^2 + 2n - 1$ **or** $n^2 + 4n + 4 - n^2 - 2n - 1$ Correct simplification e.g. $2n + 1$ **or** $2n - 1$ **or** $2n + 3$ Correct sum of their two integers is equivalent to their simplification e.g. $(n + 1) + n = 2n + 1$ **or** $n + n - 1 = 2n - 1$ **or** $(n + 1) + (n + 2) = 2n + 3$ **etc**	**(1)** **(1)** **(1)** **(1)** **(1)**
3)	Prove that $(n + 1)^2 - (n - 1)^2 + 1$ is always odd for all positive integer values of n.	$(n + 1)^2 - (n - 1)^2 + 1$ $= n^2 + 2n + 1 - (n^2 - 2n + 1) + 1$ **or** $n^2 + 2n + 1 - n^2 + 2n - 1 + 1$ $= 4n + 1$ $4n$ is even **oe and so** $4n + 1$ is odd **oe**	**(1)** **(1)** **(1)**
4)	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.	For n and $n + 1$: $n(n + 1) + (n + 1)$ $= n^2 + n + n + 1$ $= n^2 + 2n + 1$ $= (n + 1)^2$	**(1)** **(1)** **(1)**

Where to go next?

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