Algebraic Proof

Question Paper

Course	Edexcel IGCSE Maths
Section	2. Equations, Formulae & Identities
Topic	Algebraic Proof
Difficulty	Medium

Time allowed: 50

Score: /40

Percentage: /100

Question 1

Prove algebraically that

$(2n + 1)^2 - (2n + 1)$ is an even number

for all positive integer values of n.

[3 marks]

Question 2

Show that $(n + 3)^2 - (n - 3)^2$ is an even number for all positive integer values of n.

[3 marks]

Question 3

n is an integer greater than 1

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

[4 marks]

Question 4

Prove that the difference between two consecutive square numbers is always an odd number.
Show clear algebraic working.

[3 marks]

Question 5

N is a multiple of 5

$A = N + 1$
$B = N - 1$

Prove, using algebra, that $A^2 - B^2$ is always a multiple of 20

[3 marks]

Question 6

$E = n^2 + n + 5$

Ali thinks that the value of E will be a prime number for any whole number value of n.

Is Ali correct?
You must give a reason for your answer.

[2 marks]

Question 7

p is a positive number.

n is a negative number.

For each statement, tick the correct box.

	Always true	Sometimes true	Never true
$p + n$ is positive	☐	☐	☐
$p - n$ is positive	☐	☐	☐
$p^2 + n^2$ is positive	☐	☐	☐
$p^3 \div n^3$ is positive	☐	☐	☐

[4 marks]

Question 8

x is an integer.

Prove that $35 + (3x + 1)^2 - 2x(4x - 3)$ is a square number.

[4 marks]

Question 9

Which of these is a correct identity?

Circle your answer.

$$x + 4x \equiv 5x \qquad\qquad 6x \equiv 18 \qquad\qquad 2x + 1 \equiv 7 \qquad\qquad 7x + 9 \equiv x$$

[1 mark]

Question 10

$$k = n^2 + 9n + 1$$

Mo says,

"k will be a prime number for all integer values of n from 1 to 9"

Show that Mo is wrong.
You **must** show that your value of k is **not** prime.

[3 marks]

Question 11

Tick whether the following statement is true or false.

Give a reason for your answer.

When n is a positive integer, the value of $2n$ is **always** a factor of the value of $20n$.

True ☐   False ☐

[1 mark]

Question 12

Prove that the mean of any four consecutive even integers is an integer.

[4 marks]

Question 13a

Prove that the sum of four consecutive whole numbers is always even.

[3 marks]

Question 13b

Give an example to show that the sum of four consecutive integers is **not** always divisible by 4.

[2 marks]