

# Proof

## Question Paper

Level	GCSE
Subject	Maths
Exam Board	Edexcel GCSE
Topic	Proof
Grade Level	Grade 8/9
Booklet	Question Paper

**Time Allowed:** 37 minutes

**Score:** /31

**Percentage:** /100

**Grade Boundaries:**

1. The  $n$ th even number is  $2n$ .

The next even number after  $2n$  is  $2n + 2$

(a) Explain why.

.....  
.....

(1)

(b) Write down an expression, in terms of  $n$ , for the next even number after  $2n + 2$

.....

(1)

(c) Show algebraically that the sum of any 3 consecutive even numbers is always a multiple of 6

(3)

(5 marks)

2. Prove that  $(3n + 1)^2 - (3n - 1)^2$  is a multiple of 4, for all positive integer values of  $n$ .

**(3 marks)**

3. Prove, using algebra, that the sum of two consecutive whole numbers is always an odd number.

**(3 marks)**

4. Prove that

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

for all positive integer values of  $n$ .

**(3 marks)**

- \*5. Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers.

**(4 marks)**

6. Prove that  $(5n + 1)^2 - (5n - 1)^2$  is a multiple of 5, for all positive integer values of  $n$ .

**(3 marks)**

7. If  $2n$  is always even for all positive integer values of  $n$ , prove algebraically that the sum of the squares of any two consecutive even numbers is always a multiple of 4.

**(3 marks)**



8. Prove that

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

**(3 marks)**

9. Prove algebraically that the sum of the squares of any two consecutive numbers always leaves a remainder of 1 when divided by 4.

**(4 marks)**