Surname	Other names

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Edexcel/AQA/OCR
Level 1/Level 2 GCSE (9-1)

Centre Number | Candidate Number

Algebraic proof
Non-Calculator

Higher Tier

Assessment Materials – Issue

Time: n/a

Paper Reference
1MA1/1H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
- *– there may be more space than you need*.

Calculators may not be used.

- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
– use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over

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PEARSON

6/4/7/7/4/6/6/

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Prove that the sum of any odd number and any even number is odd.

(Total for Question is 2 marks)

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2. Prove that half the sum of four consecutive numbers is odd.

(Total for Question is 3 marks)

3. Prove that the product of any odd number and any even number is even.

(Total for Question is 3 marks)

4. Show that the sum of any three consecutive multiples of 3 is also a multiple of 3.

(Total for Question is 3 marks)

5. Consider the sequence: 4, 7, 10, 13, 16

Prove that the product of any two terms of this sequence is also a term of the sequence.

(Total for Question is 4 marks)

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

(Total for Question is 3 marks)

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

(Total for Question is 3 marks)

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8. Show that

$$(2a - 1)^2 - (2b - 1)^2 = 4(a - b)(a + b - 1).$$

(Total for Question is 4 marks)

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9. Prove that the square of any odd number is always one more than a multiple of 8.

(Total for Question is 4 marks)

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10. Show algebraically that the sum of any three consecutive even numbers is always a multiple of 6.

(Total for Question is 3 marks)

11. Prove that $(2n + 1)^2 - (2n - 1)^2 - 10$ is not a multiple of 8 for all positive integer values of n

(Total for Question is 4 marks)

12. Prove algebraically that for any two numbers, the product of their difference and their sum is equal to the difference of their squares.

(Total for Question is 4 marks)

13. Prove algebraically that the sum of the squares of any three consecutive even numbers is always a multiple of four.

(Total for Question is 4 marks)

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

(Total for Question is 4 marks)