

1MA1 Higher themed papers: Algebraic proof

Write your name here			
Surname	Other names		
Centre Number		Candidate Number	
Pearson Edexcel Level 1/Level 2 GCSE (9–1)			
Mathematics Algebraic proof			
		Paper Reference 1MA1	
You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.			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.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is **33**. There are **10** questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by all students in the June 2017–November 2019 examinations.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

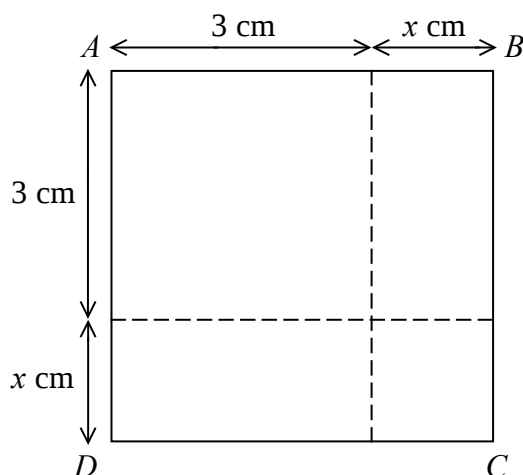
Advice

- 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.

1MA1 Higher themed papers: Algebraic proof



1



The area of square $ABCD$ is 10 cm^2 .

Show that $x^2 + 6x = 1$

(Total for Question 1 is 3 marks)

1MA1 Higher themed papers: Algebraic proof



2

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

(Total for Question 2 is 4 marks)

1MA1 Higher themed papers: Algebraic proof



3

n is an integer greater than 1

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

(Total for Question 3 is 4 marks)

1MA1 Higher themed papers: Algebraic proof



- 4 Given that n can be any integer such that $n > 1$, prove that $n^2 - n$ is never an odd number.

(Total for Question 4 is 2 marks)

- 5 Prove algebraically that the sum of the squares of any two consecutive even numbers is always a multiple of 4

(Total for Question 5 is 3 marks)

1MA1 Higher themed papers: Algebraic proof

- 6** Prove algebraically that the difference between the squares of any two consecutive odd numbers is always a multiple of 8

(Total for Question 6 is 3 marks)

1MA1 Higher themed papers: Algebraic proof



7

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.

(Total for Question 7 is 2 marks)

1MA1 Higher themed papers: Algebraic proof

- 8** Prove algebraically that the straight line with equation $x - 2y = 10$ is a tangent to the circle with equation $x^2 + y^2 = 20$

(Total for Question 8 is 5 marks)

1MA1 Higher themed papers: Algebraic proof



9 The ratio $(y + x) : (y - x)$ is equivalent to $k : 1$

Show that $y = \frac{x(k+1)}{k-1}$

(Total for Question 9 is 3 marks)

1MA1 Higher themed papers: Algebraic proof

10 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.

(1)

(Total for Question 10 is 4 marks)

TOTAL MARKS FOR PAPER: 33