Name: ____________________

ASM Tuition Academy

PROOF

Instructions:

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
  - there may be more space than you need.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all you're working out.**

Information:

- 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 time.
- Try to answer every question.
- Check your answers if you have time at the end.

Q1

Prove algebraically that the sum of any two consecutive integers is always an odd number.

(Total for Question 1 is 2 marks)

Q2

Prove algebraically that the sum of any three consecutive even integers is always a multiple of 6

(Total for Question 2 is 2 marks)

Q3

Prove that $(3m + 1)^2 - (3m - 1)^2$ is always a multiple of 12, for all positive integer values of m.

(Total for Question 3 is 2 marks)

Q4

m is an integer.

Prove algebraically that the sum of $m(m + 1)$ and $m + 1$ is always a square number.

(Total for Question 4 is 2 marks)

Q5

Prove that $(2m + 3)^2 - (2m - 3)^2$ is always a multiple of 12, for all positive integer values of m.

(Total for Question 5 is 2 marks)

Q6

m is an integer.

Prove algebraically that the sum of $(m + 2)(m + 1)$ and $m + 2$ is always a square number

(Total for Question 6 is 2 marks)

Q7

Prove that the sum of three consecutive odd numbers is always a multiple of 3

(Total for Question 7 is 2 marks)

Q8

Prove that the sum of three consecutive even numbers is always a multiple of 6.

(Total for Question 8 is 2 marks)

Q9

Prove algebraically that the sum of the squares of any two even positive integers is always a multiple of 4

(Total for Question 9 is 2 marks)

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Q10

Prove algebraically that the sum of the squares of any two odd positive integers is always even.

(Total for Question 10 is 2 marks)

Q11

Prove that the sum of the squares of any 2 consecutive integers is always an odd number

(Total for Question 11 is 3 marks)

Q12

Prove that the sum of the squares of 2 consecutive odd numbers is always 2 more than a multiple of 8.

(Total for Question 12 is 2 marks)

Q13

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

(Total for Question 13 is 3 marks)

Q14

Prove algebraically that the sum of the squares of any two consecutive even numbers is always 4 more than a multiple of 8.

(Total for Question 14 is 3 marks)
