HIGHER

8.3 Proof: 10-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Prove that $n^2 - n$ is even for any integer n.

(Total for Question 1 is 2 marks)

2 Show that the product of three consecutive integers $n(n + 1)(n + 2)$ is divisible by 3 for any integer n.

(Total for Question 2 is 2 marks)

3 Show that $(n + 1)^2 - n^2 = 2n + 1$

(Total for Question 3 is 2 marks)

4 Priya says, 'When you square a number, the answer is always bigger than the number you started with.' Show that Priya is not correct.

(Total for Question 4 is 2 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 8.3 Proof: 10-minute Pack

Question 1

factorise to n(n - 1) or show product of two consecutive integers oe	**M1**
conclude n(n - 1) is even, so n^2 - n is even cao	**A1**

Answer: n(n - 1) is even, so n^2 - n is even (for all integers n).

Question 2

note that among n, n + 1, n + 2 one is a multiple of 3 oe	**M1**
conclude n(n + 1)(n + 2) is divisible by 3 cao	**A1**

Answer: n(n + 1)(n + 2) is divisible by 3.

Question 3

$(n+1)^2$ expanded correctly to $n^2 + 2n + 1$	**M1**
$n^2 + 2n + 1 - n^2$ simplified to 2n + 1 (cso, answer given)	**A1**

Answer: $(n+1)^2 - n^2 = n^2 + 2n + 1 - n^2 = 2n + 1$, as required.

Question 4

A valid counter-example chosen, e.g. n = 0.2 (any value with 0 < n < 1, or n = 0, or n = 1), with the square correctly evaluated	**B1**
Conclusion that the square is smaller than (or equal to) the original number, so Priya's statement is not correct (cao, any valid counter-example)	**B1**

Answer: n = 0.2 gives $0.2^2 = 0.04$, and 0.04 < 0.2, so Priya's statement is false.

© Revision Library | revisionlibrary.co.uk