

## STRAND 6

## ALGEBRA

(12 marks)

|    |                                                                                                                                                                                                                                                                                                               |
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| 1. | <p>The sequence <math>\langle a_n \rangle</math> is defined by <math>a_n = \frac{2n+2}{n+1}</math></p> <p>(a) Find the 3<sup>rd</sup> term.</p> <p style="text-align: right;">3<sup>rd</sup> term = _____ (1 mark)</p>                                                                                        |
|    | <p>(b) Find the <b>limit</b> of the sequence.</p> <p style="text-align: right;">limit = _____ (2 marks)</p>                                                                                                                                                                                                   |
|    | <p>(c) Is the sequence <math>\langle a_n \rangle</math> <b>convergent</b> or <b>divergent</b>? Give a reason for your answer.</p> <p style="text-align: right;">convergent or divergent : _____ (1 mark)</p> <p style="text-align: right;">reason: _____</p> <p style="text-align: right;">_____ (1 mark)</p> |

**STRAND 6** (continued)

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| 3. | <p>Prove by <b>mathematical induction</b> that for all positive integers <math>n</math>,</p> $1 + 5 + 9 + \dots + 4n - 3 = n(2n - 1)$ <p><b>Step 1:</b> Prove that it is true for <math>n = 1</math></p> <p style="text-align: right;">(½ mark)</p> <p><b>Step 2:</b> Assume that it is true for <math>n = k</math></p> <p style="text-align: right;">(½ mark)</p> <p><b>Step 3:</b> Prove that it is true for <math>n = k + 1</math></p> <p style="text-align: right;">(1½ marks)</p> <p><b>Step 4:</b> Conclusion</p> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <p style="text-align: right;">(½ mark)</p> |
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**The end**