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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **1a** |  | **B1**  **B1** | 7.1  7.1 | 3rd  Be able to convert between polar and Cartesian coordinates |
|  | **(2)** |  |  |
| **1b** |  | **B1**  **M1**  **A1** | 7.1  7.1  7.1 | 3rd  Be able to convert between polar and Cartesian coordinates |
|  | **(3)** |  |  |
| (5 marks) | | | | |

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| Notes  **1a B1** Correct *r*  **B1** Correct  **1b B1** Correct *r*  **M1** Use of arctan to find an angle  **A1** Correct angle |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **2a** |  | **B1**  **B1** | 7.1  7.1 | 3rd  Be able to convert between polar and Cartesian coordinates |
|  | **(2)** |  |  |
| **2b** |  | **B1**  **B1** | 7.1  7.1 | 3rd  Be able to convert between polar and Cartesian coordinates |
|  | **(2)** |  |  |
| (4 marks) | | | | |
| Notes  **2a B1** *x* correct  **B1** *y* correct  **2b B1** *x* correct  **B1** *y* correct | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **3a** |  | **M1**  **M1**  **A1** | 7.1  7.1  7.1 | 3rd  Be able to convert between polar and Cartesian coordinates |
|  | **(3)** |  |  |
| **3b** |  | **M1**  **M1**  **A1\*** | 7.1  7.1  7.1 | 3rd  Be able to convert between polar and Cartesian coordinates |
|  | **(3)** |  |  |
| **3c** |  | **M1**  **M1**  **A1**  **A1\*** | 7.1  7.1  7.1  7.1 | 3rd  Be able to convert between polar and Cartesian coordinates |
|  | **(4)** |  |  |
| (10 marks) | | | | |

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| Notes  **3a M1** Attempts to substitute  **M1** Makes *r* the subject  **A1** Any correct form  **3b M1** Attempts to substitute  **M1** Use of double angle formula  **A1\*** cao  **3c M1** Attempts to substitute  **M1** Use of compound angle formula  **A1** Correctly simplified in terms of sine  **A1\*** cao |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **4a** |  | **B1**  **B1** | 7.2  7.2 | 4th  Know how to sketch standard polar curves |
|  | **(2)** |  |  |
| **4b** |  | **B1**  **B1**  **B1** | 7.2  7.2  7.2 | 4th  Know how to sketch standard polar curves |
|  | **(3)** |  |  |
| (5 marks) | | | | |
| Notes  **4a B1** Correct shape  **B1** Correct *r* value shown  **4b B1** Correct shape  **B1** Correct value on initial line  **B1** Correct value at dimple | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **5a** |  | **M1**  **A1**  **A1** | 7.3  7.3  7.3 | 6th  Know how to find simple areas enclosed by polar curves |
|  | **Alternate Method**  Area (of triangle)  = | **M1**  **A1**  **A1** |  |  |
|  | **(3)** |  |  |
| **5b** |  | **B1**  **M1**  **A1**  **A1** | 7.3  7.3  7.3  7.3 | 6th  Know how to find simple areas enclosed by polar curves |
|  | **(4)** |  |  |
| (7 marks) | | | | |

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| Notes  **5a M1** Correct use of formula  **A1** Integrates correctly  **A1** cao  **Alternate Method**  **M1** Realise the region is a triangle  **A1** Correct unsimplifed expression  **A1** cao  **5b B1** Correct use of formula  **M1** Deals with  correctly  **A1** Integrates correctly  **A1** cao |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **6a** |  | **B1**  **B1**  **B1** | 7.2  7.2  7.2 | 4th  Know how to sketch standard polar curves |
|  | **(3)** |  |  |
| **6b** | Coordinates | **M1**  **A1**  **A1** | 7.3  7.3  7.3 | 7th  Know how to find compound areas enclosed by polar curves |
|  | **(3)** |  |  |

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| **6c** |  | **M1**  **M1**  **A1**  **A1**  **A1**  **A1** | 7.3  7.3  7.3  7.3  7.3  7.3 | 7th  Know how to find compound areas enclosed by polar curves |
|  | **(6)** |  |  |
| (12 marks) | | | | |
| Notes  **6a B1** Correct shape for one curve  **B1** Correct shape for both curves  **B1** Two points of intersection (need not be labelled)  **6b M1** Sets up equation  **A1**  correct  **A1** cao both coordinate pairs  **6c M1** Attempts area under  **M1** Attempts area under  **A1** Correct integration for area under  **A1** Correct integration for area under  **A1** Substitutes limits (unsimplified) correctly  **A1** cao | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **7** | [ignore presence of absence of  ]  Points are  Equations of tangents | **B1**  **M1**  **M1**  **A1**  **A1**  **B1**  **B1** | 7.3  7.3  7.3  7.3  7.3  7.3  7.3 | 6th  Know how to find tangents and lines perpendicular to the initial line |
| (7 marks) | | | | |

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| Notes  **7 B1** Correct expression  **M1** Differentiates  **M1** Solves for a quadratic in to find  **A1** Correct value of  **A1** Correct points  **B2, 1** Each equation (any equivalent correct form) |