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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **1** | Use Pythagoras’ theorem to show that the length oforor states | **M1** | 2.2a | 6th  Solve problems involving arc length and sector area in context. |
| Makes an attempt to findor.  For example,is seen. | **M1** | 2.2a |
| Correctly states thator | **A1** | 1.1b |
| Makes an attempt to find the area of the sector with a radius of 4 and a subtended angle of  For example,is shown. | **M1** | 2.2a |
| Correctly states that the area of the sector is | **A1** | 1.1b |
| Recognises the need to subtract the sector area from the area of the rhombus in an attempt to find the shaded area.  For example,is seen. | **M1** | 3.2a |
| Recognises that to find the total shaded area this number will need to be multiplied by 2. For example, | **M1** | 3.2a |
| Using clear algebra, correctly manipulates the expression and gives a clear final answer of | **A1** | 1.1b |
| (8 marks) | | | | |
| **Notes** | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **2a** | Shows that | **M1** | 2.1 | 6th  Understand  small-angle approximations for sin, cos and tan (angle in radians). |
| Shows that | **M1** | 1.1b |
| Shows | **M1** | 2.1 |
| Recognises that | **A1** | 1.1b |
|  | **(4)** |  |  |
| **2b** | When *θ* is small, | **A1** | 1.1b | 7th  Use small-angle approximations to solve problems. |
|  | **(1)** |  |  |
| (5 marks) | | | | |
| **Notes** | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **3a** | Writes tan*x* and sec*x* in terms of sin*x* and cos*x*. For example, | **M1** | 2.1 | 5th  Understand the functions sec, cosec and cot. |
| Manipulates the expression to find | **M1** | 1.1b |
| Simplifies to find | **A1** | 1.1b |
|  | **(3)** |  |  |
| **3b** | States thator | **B1** | 2.2a | 6th  Use the functions sec, cosec and cot to solve simple trigonometric problems. |
| Writes thator | **M1** | 1.1b |
| Finds | **A1** | 1.1b |
|  | **(3)** |  |  |
| (6 marks) | | | | |
| **Notes** | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **4** | States thatand concludes that | **M1** | 3.1 | 6th  Prove  sec2*x* = 1 + tan2*x* and  cosec2*x* = 1 + cot2*x.* |
| States thatand concludes that | **M1** | 3.1 |
| States that | **M1** | 2.2a |
| States thatand concludes thatoe. | **M1** | 3.1 |
| States thatand concludes thatoe. | **M1** | 3.1 |
| Recognises the need to use Pythagoras’ theorem. For example, | **M1** | 2.2a |
| Makes substitutions and begins to manipulate the equation: | **M1** | 1.1b |
| Uses a clear algebraic progression to arrive at the final answer: | **A1** | 1.1b |
| (8 marks) | | | | |
| **Notes** | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **5** | Uses the double-angle formulae to write: | **M1** | 2.2a | 6th  Use the  double-angle formulae for sin, cos and tan. |
| Uses the fact thatandto write: | **M1** | 1.1b |
| Simplifies this expression to | **M1** | 1.1b |
| Correctly solves to find | **A1** | 1.1b |
| (4 marks) | | | | |
| **Notes** | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **6a** |  | **M1** | 1.1b | 7th  Use addition formulae and/or double-angle formulae to solve equations. |
| Usesandto write:  Award one mark for each correct use of a trigonometric identity. | **A2** | 2.2a |
|  | **(3)** |  |  |
| **6b** | States that: | **B1** | 2.2a | 7th  Use addition formulae and/or double-angle formulae to solve equations. |
| Simplifies this to write: | **M1** | 1.1b |
| Correctly finds  Additional answers might be seen, but not necessary in order to award the mark. | **M1** | 1.1b |
| States  Note that. For these values 3*θ* lies in the third quadrant, thereforeandare both negative and cannot be equal to a positive surd. | **A1** | 1.1b |
|  | **(4)** |  |  |
| (7 marks) | | | | |
| Notes  **6b**  Award all 4 marks if correct final answer is seen, even if some of the 6*θ* angles are missing in the preceding step. | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **7a** | States:    Or: | **M1** | 1.1b | 6th  Understand how to use identities  to rewrite  acos*x* + bsin*x*. |
| Deduces that: | **M1** | 1.1b |
| States that  Use of might be seen, but is not necessary to award the mark. | **A1** | 1.1b |
| Finds that  might be seen, but is not necessary to award the mark. | **A1** | 1.1b |
|  | **(4)** |  |  |
| **7b** | Uses the maths from part **a** to deduce that | **A1** | 3.4 | 7th  Solve problems involving  acos*x* + bsin*x.* |
| Recognises that the maximum temperature occurs when | **M1** | 3.4 |
| Solves this equation to find | **M1** | 1.1b |
| Finds *x* = 15.81 hours | **A1** | 1.1b |
|  | **(4)** |  |  |

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| **7c** | Deduces that | **M1** | 3.4 | 8th  Use trigonometric functions and identities to solve problems in a range of unfamiliar contexts. |
| Begins to solve the equation. For example,  is seen. | **M1** | 1.1b |
| States that Further values may be seen, but are not necessary in order to award the mark. | **M1** | 1.1b |
| Finds that *x* = 2.65 hours, 10.13 hours, 21.50 hours | **A1** | 1.1b |
|  | **(4)** |  |  |
| (12 marks) | | | | |
| **Notes** | | | | |