| **Question** | **Scheme** | | **Marks** |
| --- | --- | --- | --- |
| **1(a)** |  | | B1 |
| Uses common denominator to give | | M1 |
| Replaces  by  to give | | M1 |
| Obtains  ( *a* =3, *b* = 5, *c* = -2 ) | | A1 |
|  |  | | **(4)** |
| **1(b)** | Solves  to give cos *x* = | | M1 |
| cos *x* =  only (rejects cos *x* = -2) | | A1 |
| So *x* = 1.23 or 5.05 | | dM1A1 |
|  |  | | **(4)** |
| **1(c)** | Either | Or |  |
|  |  | B1 |
|  |  | M1 |
|  |  | M1 |
| (so ) | (so ) | A1 |
|  |  | | **(4)** |
|  |  | | **(12 marks)** |
| **2(a)** |  | |  |
|  | | B1 B1 |
|  |  | | **(2)** |
| **2(b)** |  | |  |
|  | | M1 |
| Using | | M1 |
|  | | M1 A1\* |
|  |  | | **(4)** |
| **2(c)** |  | | M1 |
|  | | A1 A1 |
|  |  | | **(3)** |
|  |  | | **(9 marks)** |
| **3(a)** |  | | M1 |
|  | | M1 A1 |
|  | | A1\* |
|  |  | | **(4)** |
| **3(b)(i)** |  | | M1 |
| cso | | dM1 A1\* |
|  |  | | **(3)** |
|  | Alternative | |  |
|  | tan 15° = tan (60° – 45°) or tan (45° – 30°) | |  |
| or | | M1 |
| or | | M1 |
| Rationalises to producetan 15° = 2 – | | A1\* |
| **3(b)(ii)** | tan 2*x* = 1 | | M1 |
| 2*x* = 45° | | A1 |
| 2*x* = 45° + 180° | | M1 |
| *x* = 22.5°, 112.5°, 202.5°, 295.5° | | A1(any two)  A1 |
|  |  | | **(5)** |
|  |  | | **(12 marks)** |
| **4(a)** |  | | M1 |
|  | | M1 |
|  | |  |
|  | | M1 A1 |
|  | | A1\* |
|  |  | | **(5)** |
| **4(b)** |  | |  |
|  | | M1 |
|  | | dM1 A1 |
|  | | dM1 |
|  | | A1 |
|  |  | | **(5)** |
|  |  | | **(10 marks)** |
| **5(a)** |  | | B1 |
|  | | M1 |
|  | | M1 |
|  | | A1\* |
|  |  | | **(4)** |
| **5(b)** |  | |  |
|  | | M1 |
|  | | A1 |
|  | | M1 |
|  | | M1 |
|  | | A2,1,0 |
|  |  | | **(6)** |
|  |  | | **(10 marks)** |
| **6(a)** |  | | B1 |
|  | | M1 |
|  | | M1 |
|  | |  |
|  | | M1 |
|  | | A1\* |
|  |  | | **(5)** |
| **6(b)** |  | |  |
|  | |  |
|  | |  |
|  | | M1 A1 |
|  | | dM1A1 |
|  |  | | **(4)** |
|  |  | | **(9 marks)** |
| **7(a)** | *R* = 25 | | B1 |
|  | | M1 A1 |
|  |  | | **(3)** |
| **7(b)** |  | | M1 |
|  | | A1 |
|  | | M1 |
|  | | A1 A1 |
|  |  | | **(5)** |
| **7(c)** | Attempts to use  **AND**  in the expression | | M1 |
|  | |  |
|  | | A1 |
|  |  | | **(2)** |
| **7(d)** |  | |  |
| Maximum value =’*R*’+’*c*’ | | M1 |
| = 32 cao | | A1 |
|  |  | | **(2)** |
|  |  | | **(12 marks)** |
| **8(a)** |  | | M1A1 |
| (÷ cos *A*cos *B*) | | M1 |
| = | | A1 \* |
|  |  | | **(4)** |
| **8(b)** |  | | M1 |
|  | | M1 |
|  | | A1 \* |
|  |  | | **(3)** |
| **8(c)** |  | | M1 |
|  | | M1 |
|  | | M1 A1 |
|  | | M1 |
|  | | A1 |
|  |  | | **(6)** |
|  |  | | **(13 marks)** |
| **9(a)** |  | | M1 |
|  | | M1 |
|  | |  |
|  | | dM1 A1\* |
|  |  | | **(4)** |
| **9(b)** |  | |  |
|  | | M1 |
|  | | M1 |
|  | | M1 |
| Two of | | A1 |
| All four of | | A1 |
|  |  | | **(5)** |
|  |  | | **(9 marks)** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | C3 June 2014R | 3 | 5.4, 5.5, 5.6, 5.7, 5.8 | Trigonometry | 1.1b, 1.2, 2.1, |
| 2 | C3 2012 | 5 | 5.4, 5.5, 5.6, 5.7, 5.8 | Trigonometry | 1.1b, 2.1, 3.1a |
| 3 | C3 2011 | 6 | 5.3, 5.4, 5.6, 5.7, 5.8 | Trigonometry | 1.1b, 2.1, 3.1a |
| 4 | C3 June 2014 | 7 | 5.5, 5.6, 5.7, 5.8 | Trig identities and equation solving | 1.2, 1.1b, 2.1, 2.2a |
| 5 | C3 2016 | 8 | 5.5, 5.6, 5.7, 5.8 | Proof and equation | 1.1b, 2.1, 3.1a |
| 6 | C3 2015 | 8 | 5.5, 5.6, 5.7, 5.8 | Proof using sec and double angle formulae | 1.1b, 1.2, 2.1, 3.1a |
| 7 | C3 2012 | 8 | 5.6, 5.7, 5.8 | Trigonometry | 1.1b, 2.1, 2.1a, |
| 8 | C3 Jan 2012 | 8 | 5.3, 5.6, 5.7, 5.8 | Trigonometry | 1.1b, 2.1, 2.2a, 3.1a |
| 9 | C3 2017 | 9 | 5.5, 5.6. 5.7 | Trig proof, equation involving double angles | 1.1b, 1.2, 2.1, 3.1a |