| **Question** | **Scheme** | | | | | | | **Marks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1(a)** | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | *x* | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | | *y* | 16.5 | 7.361 | **4** | **2.31** | 1.278 | 0.556 | 0 | | | | | | | | B1 B1 |
|  |  | | | | | | | **(2)** |
| **1(b)** |  | | | | | | | B1 M1 A1ft |
| = 11.88 (or answers listed below in note) | | | | | | | A1 |
|  |  | | | | | | | **(4)** |
| **1(c)** | = | | | | | | | M1 A1 A1 |
| = | | | | | | | M1 |
| = or equivalent | | | | | | | A1 |
|  |  | | | | | | | **(5)** |
|  |  | | | | | | | **(6 marks)** |
| **2(a)** | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | *x* | 2 | 2.25 | 2.5 | 2.75 | 3 | |  | *y* | 0.5 | 0.38 | 0.298507… | 0.241691… | 0.2 | | | | | | | |  |
| At  At | At least one *y*-ordinate correct. | | | | | | B1 |
|  | Both *y*-ordinates correct. | | | | | | B1 |
|  |  | | | | | | | **(2)** |
| **2(b)** |  | | | | | | Outside brackets  or | B1 aef |
| For structure of ; | M1 |
| Correct expression  inside brackets which all must be multiplied by their “outside constant”. | A1 |
|  | | | | | |  | A1 |
|  |  | | | | | | | **(4)** |
| **2(c)** | Area of triangle | | | | | | | B1 |
|  | | | | | | | M1 |
|  | | | | | | | A1 ft |
|  |  | | | | | | | **(3)** |
|  |  | | | | | | | **(9 marks)** |
| **3(a)** | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | *x* | 0 | 0.25 | 0.5 | 0.75 | 1 | | *y* | 1 | 1.251 | **1.494** | **1.741** | 2 | | | | | | | | B1 B1 |
|  |  | | | | | | | **(2)** |
| **3(b)** | o.e. | | | | | | | B1 M1 A1 ft |
| = 1.4965 | | | | | | | A1 |
|  |  | | | | | | | **(4)** |
|  |  | | | | | | | **(6 marks)** |
| **4(a)** |  | | | | | | |  |
| 6.272 , 3.634 | | | | | | | B1 B1 |
|  |  | | | | | | | **(2)** |
| **4(b)** |  | | | | | | | B1 |
|  | | Need {} or implied later for A1ft | | | | | M1A1ft |
| = | | | | | | |  |
| = 11.42 | | | | | | | A1 cao |
|  |  | | | | | | | **(4)** |
| **4(c)** | = | | M1: on any term | | | | | M1A1A1A1 |
| A1: | | | | |
| A1: | | | | |
| A1: + | | | | |
|  | | Attempt to subtract either way round using the limits 4 and 1. Dependent on the previous M1 | | | | | dM1 |
| = (48 – 36) | | | | | | |  |
| 12 | | | | | | | A1 cao |
|  |  | | | | | | | **(6)** |
|  |  | | | | | | | **(12 marks)** |
| **5(a)** | (a) ,  awrt , | | | | | | | B1 B1 |
|  |  | | | | | | | **(2)** |
| **5(b)** | (b) | | | | | | | B1 |
|  | | | | | | | M1 |
| Accept 1.3 | | | | | | | A1 |
|  |  | | | | | | | **(3)** |
| **5(c)** | (c) | | | | | | | B1 |
|  | | | | | | | B1 |
|  | | | | | | | M1 |
| Hence  🞹 cso | | | | | | | A1 |
|  |  | | | | | | | **(4)** |
| **5(d)** | (d) | | | | | | | M1 A1 |
|  | | | | | | |  |
|  | | | | | | | M1 A1 |
|  | | | | | | |  |
|  | | | | | | |  |
| = | | | | | | | M1 |
|  | | | | | | | A1 |
|  |  | | | | | | | **(6)** |
|  |  | | | | | | | **(15 marks)** |
| **6(a)** | 0.73508 | | | | | | | B1 **cao** |
|  |  | | | | | | | **(1)** |
| **6(b)** |  | | | | | | | B1 M1 |
| (4 dp) | | | | awrt 1.1504 | | | A1 |
|  |  | | | | | | | **(3)** |
| **6(c)** |  | | | |  | | | B1 |
|  | | | |  | | | B1 |
|  | | | |  | | | M1 |
|  | | | |  | | | dM1 |
| **AG** | | | |  | | | A1 cso |
|  |  | | | |  | | | **(5)** |
| **6(d)** |  | | | | | Applying limits  and either way round. | | M1 |
|  | | | | | | |  |
|  | | | or  or awrt 1.2 | | | | A1 |
|  | | | awrt 0.077  or awrt 6.3(%) | | | | A1 cso |
|  |  | | | | | | | **(3)** |
|  |  | | | | | | | **(12 marks)** |
| **7(a)** | |  |  |  |  |  | | --- | --- | --- | --- | --- | | *x* | 1 | 2 | 3 | 4 | | *y* | ln2 |  |  | 2ln8 | |  | 0.6931 | 1.9605 | 3.1034 | 4.1589 | | | | | | | | M1 |
|  | | | | | | | B1 |
|  | | | | | | | M1 |
| 7.49 cao | | | | | | | A1 |
|  |  | | | | | | | **(4)** |
| **7(b)** |  | | | | | | | M1 A1 |
|  | | | | | | |  |
|  | | | | | | | M1 A1 |
|  |  | | | | | | | **(4)** |
| **7(c)** |  | | | | | | | M1 |
| Using or implying | | | | | | | M1 |
|  | | | | | | | A1 |
|  |  | | | | | | | **(3)** |
|  |  | | | | | | | **(11 marks)** |
| **8(a)** | awrt | | | | | | | B1 |
| awrt or | | | | | | | B1 |
|  |  | | | | | | | **(2)** |
| **8(b)** |  | | | | | | | B1 M1 A1ft |
|  | 0.542 or 0.543 | | | | | | | A1 |
|  |  | | | | | | | **(4)** |
| **8(c)** |  | | | | | | | B1 |
|  | | | | | | | M1 |
|  | | | | | | | A1 |
|  | | | | | | | M1 A1 |
| , | | | | | | | B1 |
|  | | | | | | | M1 |
|  | | | | | | | A1 |
|  |  | | | | | | | **(8)** |
|  |  | | | | | | | **(14 marks)** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | C2 Jan 2012 | 6 | 8.2, 8.3 and 9.3 | Integration, numerical integration | 1.1b |
| 2 | C2 Jan 2011 | 6 | 9.3, 8.3 | Integration, numerical integration | 1.1b, 3.1a |
| 3 | C2 2012 | 7 | 9.3 | Numerical integration | 1.1b |
| 4 | C2 Jan 2013 | 9 | 8.3, 9.3 | Integration, numerical integration | 1.1b |
| 5 | C4 2011 | 4 | 8.3, 8.4, 9.4 | Integration, Numerical integration | 1.1b |
| 6 | C4 Jan 2012 | 6 | 8.2, 8.3, 8.5, 9.4 | Integration | 1.1b, 2.1, |
| 7 | C4 2012 | 7 | 8.5, 9.4 | Integration, Numerical integration | 1.1b, 2.1 |
| 8 | C4 Jan 2011 | 7 | 8.3,8.5, 9.4 | Integration, Numerical integration | 1.1b, 3.1a |