| **Question** | **Scheme** | | | **Marks** |
| --- | --- | --- | --- | --- |
| **1(a)** | (a) - 1 accept (–1, 0) | | | B1 |
|  |  | | | **(1)** |
| **1(b)** | Shape  Touches at (0,0)  Crosses at (2,0)  **only** | | | B1  B1  B1 |
|  |  | | | **(3)** |
| **1(c)** | (c ) 2 solutions as **curves** cross twice | | | B1 ft |
|  |  | | | **(1)** |
|  |  | | | **(5 marks)** |
| **2(a)** | (-2, 12)  (3, -24) | | | B1 |
| B1 |
|  |  | | | **(2)** |
| **2(b)** |  | | | M1 |
| A1 |
| A1 |
|  |  | | | **(3)** |
|  |  | | | **(5 marks)** |
| **3(a)** |  | | |  |
| Correct shape with a single crossing of each axis | | | B1 |
| *y* = 1 labelled or stated | | | B1 |
| *x* = 3 labelled or stated | | | B1 |
|  |  | | | **(3)** |
| **3(b)** | Horizontal translation so crosses the *x*-axis at (1, 0) | | | B1 |
| New equation is | | | M1 |
| When *x* = 0 *y* = | | | M1 |
| = | | | A1 |
|  |  | | | **(4)** |
|  |  | | | **(7 marks)** |
| **4(a)** | Check graph in question for possible answers and space below graph for answers to part (b) | | |  |
|  | | |  |
| is translated up or down | | | M1 |
| is in the correct position | | | A1 |
| Intersection with *x*-axis at  **only**  Independent mark | | | B1 |
| : attempt at straight line, with positive gradient with positive *y* intercept | | | B1 |
| Intersection with *x*-axis at **and** *y*-axis at | | | B1 |
|  |  | | | **(5)** |
| **4(b)** | Asymptotes :  (or *y*-axis) and  (Lose second B mark for extra asymptotes) | An asymptote stated correctly  Independent of part (a) | | B1 |
|  | These two lines only  Not ft their graph. | | B1 |
|  |  | | | **(2)** |
| **4(c)** | Method 1: | Method 2: | | M1 |
|  |  | | dM1 |
|  |  | | A1 |
| When  When | When  When | | M1A1 |
|  |  | | | **(5)** |
|  |  | | | **(12 marks)** |
| **5(a)** |  | | | B1 |
|  | | | M1 |
|  | | | A1 |
|  |  | | | **(3)** |
| **5(b)** |  | | | M1  B1  A1 |
|  |  | | | **(3)** |
| **5(c)** |  | | | B1 B1 |
|  | | | M1 |
| cao | | | A1 |
|  |  | | | **(4)** |
|  |  | | | **(10 marks)** |
| **6(a)** |  | | Shape through (0, 0) | B1 |
| (3, 0) | B1 |
| (1.5, −1) | B1 |
|  |  | | | **(3)** |
| **6(b)** |  | | Shape | B1 |
| (0, 0) and (6, 0) | B1 |
| (3, 1) | B1 |
|  |  | | | **(3)** |
| **6(c)** |  | | Shape not through (0, 0) | M1 |
| Minimum in 4th quadrant | A1 |
| (−*p*, 0) and (6 − *p*, 0) | B1 |
| (3 − *p*, −1) | B1 |
|  |  | | | **(4)** |
|  |  | | | **(10 marks)** |
| **7(a)** |  | | Horizontal translation | B1 |
| Touching at (–5, 0) | B1 |
| The right hand tail of their cubic shape crossing at (–1, 0) | B1 |
|  |  | | | **(3)** |
| **7(b)** |  | | | B1 |
|  |  | | | **(1)** |
| **7(c)** | When *x* = 0, *y* = 25 | | | M1 A1 |
|  |  | | | **(2)** |
|  |  | | | **(6 marks)** |
| **8(a)(i)** |  | | | B1 |
| B1 |
|  |  | | | **(2)** |
| **8(a)(ii)** |  | | | B1 |
| B1 |
|  |  | | | **(2)** |
| **8(b)** |  | | | M1 |
|  | | | M1 |
|  | | | A1\* |
|  |  | | | **(3)** |
| **8(c)** | or | | | M1A1 |
| , | | | M1 |
| , | | | A1 |
|  |  | | | **(4)** |
|  |  | | | **(11 marks)** |
| **9(a)** | This may be done by completion of square or by expansion and comparing coefficients | | |  |
| *a* = 4 | | | B1 |
| *b* = 1 | | | B1 |
| All three of *a* = 4, *b* = 1 and *c =* –1 | | | B1 |
|  |  | | | **(3)** |
| **9(b)** |  | | |  |
| U shaped quadratic graph. | | | M1 |
| The curve is correctly positioned with the minimum in the third quadrant. . It crosses *x* axis twice on negative *x* axis and *y* axis once on positive *y* axis. | | | A1 |
| Curve cuts *y*-axis atonly | | | B1 |
| Curve cuts *x*-axis at  and | | | B1 |
|  |  | | | **(4)** |
|  |  | | | **(7 marks)** |
| **10(a)** | {Coordinates of *A* are} | | | B1 |
|  |  | | | **(1)** |
| **10(b)(i)** | 1.5  27  *O*  - 3  *y*  *x* | | Horizontal translation | M1 |
| -3 and their ft 1.5 on postitive *x*-axis | A1 ft |
| Maximum at 27 marked on the *y*-axis | B1 |
|  |  | | | **(3)** |
| **10(b)(ii)** | 1.5  27  *O*  *y*  *x* | | Correct shape, minimum at  and a maximum within the first quadrant. | M1 |
| 1.5 on *x*-axis | A1 ft |
| Maximum at | B1 |
|  |  | | | **(3)** |
| **10(c)** |  | | | B1 |
|  |  | | | **(1)** |
|  |  | | | **(8 marks)** |
| **11(a)(i)** |  | | | M1A1 |
| **11(a)(ii)** | only | | | B1 |
|  |  | | | **(3)** |
| **11(b)** |  | | | M1 |
|  |  | | | M1A1\* |
|  |  | | | **(3)** |
| **11(c)** |  | | | M1 |
|  | | | **d**M1 |
|  | | | A1 cso |
|  | | | **dd**M1 |
|  | | | A1 cso |
|  |  | | | **(5)** |
|  |  | | | **(11 marks)** |
| **12(a)** |  | | |  |
| **(i)** | Correct shape ( -ve cubic) | | | B1 |
| Crossing at (-2, 0) | | | B1 |
| Through the origin | | | B1 |
| Crossing at (3,0) | | | B1 |
| **(ii)** | 2 branches in correct quadrants not crossing axes | | | B1 |
| One intersection with cubic on each branch | | | B1 |
|  |  | | | **(6)** |
| **12(b)** | “2” solutions | | | B1ft |
| Since only “2” intersections | | | dB1ft |
|  |  | | | **(2)** |
|  |  | | | **(8 marks)** |

|  |  |  |  |  |  |
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|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | C1 2014 | 4 | 2.7 | Graphs of functions/intersections to solve equations | 1.1b, 2.4 |
| 2 | C1 2016 | 4 | 2.9 | Transformation of graphs | 1.1b |
| 3 | C1 Jan 2011 | 5 | 2.7 and 2.9 | Graphs and their transformations | 1.1b, 3.1a |
| 4 | C1 Jan 2013 | 6 | 2.3, 2.4 and 2.9 | Simultaneous equations, Graphs and their transformations | 1.1b, 3.1a |
| 5 | C1 2015 | 8 | 2.6, 2.7 and 3.1 | Manipulation of cubic and graph | 1.1b, 2.1, 3.1a |
| 6 | C1 2011 | 8 | 2.9 | Graphs and their transformations | 1.1b |
| 7 | C1 2013 | 8 | 2.6, 2.7 and 2.9 | Graphs, algebraic manipulation of polynomials | 1.1b, 2a |
| 8 | C1 2017 | 9 | 2.3, 2.4, 2.5, 2.7 and 2.9 | Graphs, intersections and discriminant | 1.1b and 2.2a, 2.4, 3.1a |
| 9 | C1 Jan 2013 | 10 | 2.3 | Quadratics, Graphs and their transformations | 1.1b |
| 10 | C1 2012 | 10 | 2.7 and 2.9 | Graphs and their transformations | 1.1b, 2.2a |
| 11 | C1 2017 | 10 | 2.3, 2.6, 2.9, 7.2, | Cubic function, transformations and gradient | 2.2a, 2.4 and 3.1a and 3.2a |
| 12 | C1 Jan 2011 | 10 | 2.4 and 2.7 | Quadratics, Polynomials, Factor theorem, Graphs and their transformations | 1.1b, 2.2a, 2.4 |