| **Question** | **Scheme** | **Marks** |
| --- | --- | --- |
| **1(a)** | [] so  | M1A1 |
|  |  | **(2)** |
| **1(b)** |  | Shape  | B1 |
| Touching *x*-axis at origin | B1 |
| Through and not touching or stopping at −2 on *x* –axis. Ignore extra intersections. | B1 |
|  |  | **(3)** |
| **1(c)** | At *x* = −2:  | M1 |
| At *x* = 0: (Both values correct) | A1 |
|  |  | **(2)** |
| **1(d)** |  | Horizontal translation (touches *x*-axis still) | M1 |
|  and *k* marked on positive *x*-axis | B1 |
| (o.e) marked on negative *y*-axis | B1 |
|  |  | **(3)** |
|  |  | **(10 marks)** |
| **2(a)** |  | Shape (cubic in this orientation) | B1 |
| **Touching** *x*-axis at **−3** | B1 |
| **Crossing** at **−1** on *x*-axis | B1 |
| Intersection at **9** on *y*-axis  | B1 |
|  |  | **(4)** |
| **2(b)** |  or equiv. (possibly unsimplified) | B1 |
| Differentiates their polynomial correctly – may be unsimplified | M1 |
|  | A1 cso |
|  |  | **(3)** |
| **2(c)** | At *x* = −5:  | B1 |
| At *x* = −5:  | B1 |
| or *y* = “20*x*” *+ c*with (-5, -“16”) used to find *c* | M1 |
|  | A1 |
|  |  | **(4)** |
| **2(d)** | Parallel:  | M1 |
| *x* = … | M1 |
|  | A1 |
|  |  | **(3)** |
|  |  | **(14 marks)** |
| **3(a)** |  | M1 |
|  | M1A1 |
|  | ddM1A1 |
|  |  | **(5)** |
| **3(b)** | At  | B1 |
|    | M1A1 |
|  | M1 |
|  | A1 |
|  |  | **(5)** |
|  |  | **(10 marks)** |
| **4(a)** |  | M1A1 |
|  |  | **(2)** |
| **4(b)** | Gradient of given line is  | B1 |
|  | M1 |
| ”24 – 4*k* + 5” = “”” | dM1A1 |
|  |  | **(4)** |
| **4(c)** |  | M1 A1 |
|  |  | **(2)** |
| **4(d)** | or or  | M1 A1 |
|  |  | **(2)** |
|  |  | **(10 marks)** |
| **5(a)** |  |  |  |
|  |  |  |
| ( *x >* 0 ) | M1 A1 A1 |
|  |  | **(3)** |
| **5(b)** | (When  so )  | B1 |
|  |  | M1 |
| **Either** :  | **or**:  and  | M1 |
| **So**   |  | A1 |
|  |  | **(4)** |
| **5(c)** | Tangent at *Q* is parallel to  |  |
|  so tangent gradient is   | B1 |
| So,  | Sets their gradient function = their numerical gradient. | M1 |
|  | Ignore extra answer *x* = –9 | A1 |
| When  | Substitutes their found *x* into equation of curve. | M1 |
|  | A1 |
|  |  | **(5)** |
|  |  | **(12 marks)** |
| **6(a)** |  | M1A1A1A1 |
|  |  | **(4)** |
| **6(b)** | *x* = 4  *y* = × 64 – 9 × 23 + + 30 | M1 |
|  = 32 – 72 + 2 + 30 = – 8  | A1 cso |
|  |  | **(2)** |
| **6(c)** | *x* = 4  *y*’= × 42 – × 2 –  | M1 |
|  = 24 – 27 – = – | A1 |
| Gradient of the normal: –1 ÷“” | M1 |
| Equation of normal: *y* – –8 = (*x* – 4) | M1A1ft |
|  | 7*y* – 2*x* + 64 = 0  | A1 |
|  |  | **(6)** |
|  |  | **(12 marks)** |
| **7(a)** |  | B1 |
|  |  | **(1)** |
| **7(b)** |  | M1A1 |
| At , (= *m*) | A1 |
| Gradient of normal  | M1 |
| Equation of normal:  | M1 |
|  2*x* + 8*y* – 1 = 0 **(\*)** | A1cso |
|  |  | **(6)** |
| **7(c)** |  | M1 |
|  [ = **]** or []  |  |
| leading to *x* = … | M1 |
|   | A1 |
|  *y* =  (or exact equivalent)  | A1ft |
|  |  | **(4)**  |
|  |  | **(11 marks)** |
| **8(a)** | Substitutes x = 2 into  and gets 3 | B1 |
|  | M1 A1 |
| Substitute  then finds negative reciprocal (-2) | dM1 |
|  |  |
| States or uses  or *y* = -2*x* + *c* with their (2, 3) | dM1 |
| to deduce that  \*  | A1\* |
|  |   | **(6)** |
| **8(b)** | Put  and simplify to give  | M1A1 |
|  Or put  to give   |  |
|   so *x* = or (*y* – 3) (*y* + 2) = 0 so *y* = | dM1 |
|   | A1, A1 |
|  |  | **(5)** |
|  |  | **(11 marks)** |
| **9(a)** |  | M1 |
| Either Substitute *x* = 1 to give | Or Solve to give *x* =  | A1 |
| So turning point (all correct work so far) | Deduce *x* = 1 from correct work | A1cso |
|  |  | **(3)** |
| **9(b)** |  When *x* = 1, *y* = 4 + 9 30 8 = 25 | B1 |
|  Area of triangle *ABP* =  × 1 × 25 = 12.5 (Where *P* is at (1, 0)) | B1 |
| or   | M1A1 |
| (1 + 3 – 15 – 8) – (19)  or 19 – 1.02  | dM1 |
| So Area = “*their* 12.5” + “*their* ” or or “12.5” + “ 20.02” or “12.5” + “*their* ” | ddM1 |
| = 32.52 (NOT – 32.52) | A1 |
|  |  | **(7)** |
|  |  | **(10 marks)** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | C1 Jan 2012 | 8 | 7.2, 2.7 and 2.9 | Differentiation, graphs and their transformations | 1.1b, 2.2a |
| 2 | C1 2011 | 10 | 2.7, 7.2 and 7.3 | Differentiation, graphs and their transformations | 1.1b, 2.1, 2.2a, 2.4, 3.1a |
| 3 | C1 2015 | 6 | 7.2 and 7.3 | Differentiation, calculation of equation of tangent | 1.1b |
| 4 | C1 2016 | 11 | 3.1, 7.2 and 7.3 | Parallel lines, tangent to curve | 1.1b, 2.2a, 3.1a |
| 5 | C1 Jan 2013 | 11 | 3.1, 7.1, 7.2 and 7.3 | Differentiation, straight lines | 1.1b, 2.4, 3.1a |
| 6 | C1 Jan 2011 | 11 | 3.1, 7.2, 7.3 | Differentiation, straight lines | 1.1b, 2.1, 2.4 |
| 7 | C1 Jan 2012 | 10 | 7.2, 7.3, 2.4, 2.6 | Differentiation, quadratics, graphs and their transformations | 1.1b, 2.1, 3.1a |
| 8 | C1 June 2014R | 11 | 7.2, 7.3, 2.4 | Equation of normal, intersection of graphs | 1.1b, 2.1, 3.1a |
| 9 | C2 2017 | 10 | 7.2, 7.3, 8.2 and 8.3 | Differentiation and turning point, definite integration | 1.1b, 3.1a |