**Year 11 to Year 12 Transition Paper**

**Graphs and Transformations**

**Mark Scheme**

|  |  |  |
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| **Question** | **Scheme** | **Marks** |
| **1** | B | B1cao |
| **(1 mark)** |

|  |  |  |
| --- | --- | --- |
| **Question** | **Scheme** | **Marks** |
| **2(a)** | For reflection in *x*-axis | Correct graph | M1 |
| For curve drawn with (−4, 0), (0, 0) and (−2, 3) labelled | A1 |
|  | **(2)** |
| **(b)** | for stretch in direction of *y*-axis | Correct graph | M1 |
| for curve drawn with (– 4, 0), (0, 0) and (–2, – $\frac{3}{2}$) labelled | A1 |
|  | **(2)** |
| **(4 marks)** |

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| **Question** | **Scheme** | **Marks** |
| **3(a)** |  | B1 |
| B1 |
|  | **(2)** |
| **(b)** |  | M1 |
| A1 |
| A1 |
|  | **(3)** |
| **(5 marks)** |

| **Question** | **Scheme** | **Marks**  |
| --- | --- | --- |
| **4(a)** |  | B1 |
|  | M1 |
|  | A1 |
|  | **(3)** |
| **(b)** |     | M1B1A1 |
|  | **(3)** |
| **(c)** |  | B1 B1 |
|  | M1 |
|  cao | A1 |
|  | **(4)** |
| **(10 marks)** |

| **Question** | **Scheme** | **Marks**  |
| --- | --- | --- |
| **5(a)** |  | Horizontal translation  | B1 |
|   |
| Touching at (–5, 0).  | B1 |
| The right hand tail of their cubic shape crossing at (–1, 0). | B1 |
|  | **(3)** |
| **(b)** |  | B1 |
|  | **(1)** |
| **(c)** | When *x* = 0, *y* = 25 | M1 A1 |
|  | **(2)** |
| **(6 marks)** |

| **Question** | **Scheme** | **Marks**  |
| --- | --- | --- |
| **6(a)** |  | M1A1 |
|  | **(2)** |
| **(b)** | (0, 19)(4, 3) | B1  |
| B1 |
| B1 |
|  | **(3)** |
| **(c)** |  | M1 |
|  | A1 |
|  | A1 |
|  | **(3)** |
| **(8 marks)** |

| **Question**  | **Scheme** | **Marks**  |
| --- | --- | --- |
| **7(a)** | - 1 accept (–1, 0)  | B1 |
|  | **(1)** |
| **(b)** |  |  |
|   |  |
|  Shape Touches at (0,0) Crosses at (2,0) **only** | B1B1B1 |
|  | **(3)** |
| **(c)** | 2 solutions as **curves** cross twice | B1 ft |
|  | **(1)** |
| **(5 marks)** |

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| **Question**  | **Scheme** | **Marks** |
| **8(a)** | {Coordinates of *A* are}  | See notes below | B1 |
|  | **(1)** |
| **(b)(i)** |  |  |  |
| 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)** |
| **(ii)** |  |  |  |
| Correct shape, minimum at  and a maximum within the first quadrant. | M1 |
| 1.5 on *x*-axis | A1 ft |
| Maximum at  | B1 |
|  |  |
|  | **(3)** |
| **(c)** |  | B1  |
|  | **(1)** |
| **(8 marks)** |

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| **Question**  | **Scheme** | **Marks** |
| **9(a)** |  | Shape through (0, 0) | B1 |
| (3, 0)  | B1 |
| (1.5, −1) | B1 |
|  | **(3)** |
| **(b)** |  | Shape  | B1 |
| (0, 0) and (6, 0)  | B1 |
| (3, 1) | B1 |
|  | **(3)** |
| **(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)** |

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| **Question**  | **Scheme** | **Marks** |
| **10(a)** |  *y*O*x*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)** |
| **(b)** |  Asymptotes :  (or *y*-axis) and  (Lose second B mark for extra asymptotes) | An asymptote stated correctly. Independent of (a) | B1 |
| These two lines only. Not ft their graph.  | B1  |
|  | **(2)** |
| **(c)** | Method 1:  | Method 2:  | M1 |
|  |   | dM1 |
|  |   | A1 |
| When ,When  | When  When . | M1A1 |
|  | **(5)** |
| **(12 marks)** |

| **Question** | **Scheme** | **Marks**  |
| --- | --- | --- |
| **11(a)(i)** | (0, *c*) | B1 |
| B1 |
| **(a)(ii)** | *y* = 5 | B1 |
| B1 |
|  | **(4)** |
| **(b)** |  | M1 |
|  | M1 |
|  | A1\* |
|  | **(3)** |
| **(c)** | or | M1A1 |
| ,  | M1 |
| ,  | A1 |
|  | **(4)** |
| **(11 marks)** |

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| **Question** | **Scheme** | **Marks** |
| **12(a)** | (o.e.) | M1 |
|   (o.e.) e.g.  | A1 |
|  | M1 |
|  , so no roots or no intersections or no solutions | A1 |
|  | **(4)** |
| **(b)** | Curve: shape and passing through (0, 0) shape and passing through (5, 0)Line : +ve gradient and no intersections with *C.* If no *C* drawn score B0 Line passing through (0, 2) and  (0.8, 0) marked on axes | B1B1B1B1 |
|  | **(4)** |
| **(8 marks)** |

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| **Question** | **Scheme** | **Marks** |
| **13(a)(i)** |  | Similar shape to the given figure passing through *O* (be generous if it just misses *O* but the intention is clear) **and** with evidence of a horizontal stretch taken from the *x* coordinates of the max/min point(s) but with no contradiction if both points are given. There should be no change in the *y* coordinates. **The origin does not need to be labelled.** | B1 |
| Maximum at (2, 4) | B1 |
| Minimum at (6, 0) | B1 |
|  | The coordinates may appear on the sketch, or separately in the text. If a point on an axis appears on the sketch it is not necessary to give both coordinates. So, for example, 6 or (0, 6) on the *x* - axis would get credit, but if the answer is given in the text (6, 0) is needed. If there is any ambiguity, the sketch has precedence. |  |
| **(a)(ii)** |  | Similar shape translated horizontally. Ignore any coordinates given. | M1 |
| Minimum at (1, 0) and crosses or at least reaches *x*-axis at (−2, 0) | A1 |
| Maximum at (−1, 4) – must correspond to a maximum in the 2nd quadrant **and** crosses the *y*-axis at (0, 2) | A1 |
|  | **(6)** |
|  | The coordinates may appear on the sketch, or separately in the text. If a point on an axis appears on the sketch it is not necessary to give both coordinates. So, for example, 2 or (2, 0) on the *y*-axis would get credit but if the answer is given in the text (0, 2) is needed. If there is any ambiguity, the sketch has precedence. |  |
| **(b)** | *a* = 1 **or** *k* = − 4 | One correct value | B1 |
| *a* = 1 **and** *k* = − 4 | Both correct | B1 |
| **Note that these marks may be implied by sight of e.g. “f(*x*) – 4” and/or “(1, 0)”** |  |
| **Note that the answer to (b) often appears at the bottom of page 1** |
|   | **(2)** |
| **(8 marks)** |

| **Question** | **Scheme** | **Marks**  |
| --- | --- | --- |
| **14(a)** | (4, 7) | Accept (4, 7) or *x* = 4, *y* = 7 or a sketch ofwith a maximum point marked at (4, 7). (Condone missing brackets)There should be no other coordinates. | B1 |
|  | **(1)** |
| **(b)** | (*x* =) 2.5 | Allow (2.5, 0) (condone missing brackets) but no other values or points. Allow a sketch of f(2*x*) with the only *x*-intercept marked at *x* = 2.5 (Allow (0, 2.5) marked in the correct place. | B1 |
|  | **(1)** |
| **(c)** |  (oe e.g. *y* – 1 = 0) | Must be an equation and not just '1' and no other asymptotes stated. | B1 |
|  | **(1)** |
| **(d)** |  **or**  | Either of  or Accept either of  or Note that *k* = 7 may sometimes be seen embedded in e.g. *k* = 0, 1, 7 and can score B1 here. | B1 |
|    | Both correct and in terms of *k* with no other solutions. | B1 |
|  | **(2)** |
| **(5 marks)** |

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| **Question** | **Scheme** | **Marks** |
| **15(a)** |   | B1 |
|  | **(1)** |
| **(b)** |   | B1 |
|  | **(1)** |
| **(c)** |  | B1 |
|  | **(1)** |
| **(d)** |   | B1 |
|  | **(1)** |
| **(4 marks)** |