| **Question** | **Scheme** | **Marks** |
| --- | --- | --- |
| **1(a)** |  | M1 A1 |
| **\*\*** GIVEN ANSWER | A1 |
|  |  | **(3)** |
| **1(b)** |  | M1 A1 |
|  |  |
|  | M1 |
| = 4 s or (1.7 s or 1.71 s) | A1 A1 |
|  |  | **(5)** |
|  |  | **(8 marks)** |
| **2(a)** |  | M1  A1 |
|  |  | **(2)** |
| **2(b)** |  | M1A1  dM1  A1A1 |
|  |  | **(5)** |
|  |  | **(7 marks)** |
| **3(a)** | Max ht . | M1A1 |
|  |  | **(2)** |
| **3(b)** | Max ht  \* Given answer\*  Or use of | M1A1 |
|  |  | **(2)** |
| **3(c)** |  | M1 |
|  |  |
|  | dM1A1 |
|  |  | A1 |
|  |  | **(4)** |
|  |  | **(8 marks)** |
| **4(a)** |  | B1  0 < *t* < 50  B1  50 < *t*  B1  (*V*,8,15,  20,30) |
|  |  | **(3)** |
| **4(b)** | Use area under graph or *suvat* to form an equation in *V* only. | M1 |
|  | A1 |
|  |  | **(2)** |
| **4(c)** | (and /or ) | M1 |
| , (and/or ) | A1 |
| Total time = (seconds) | dM1A1 |
|  |  | **(4)** |
| **4(d)** | Total distance =  =  = 908 (m) | M1A2 ft  A1 |
|  |  | **(4)** |
|  |  | **(13 marks)** |
| **5(a)** | Use of | M1 |
| (+ or – 50) | A1 |
| (+ or – 50) | A1 |
| 50 = | M1 |
| or better | A1 |
|  |  | **(5)** |
| **5(b)** | (18 to 2 s.f.)  (use of 2.8 gives 17.584) | M1A1 |
|  |  | **(2)** |
|  |  | **(7 marks)** |
| **6(a)** |  | M1 A1 |
|  | A1 |
|  |  | **(3)** |
| **6(b)** | => *a* = 2 | M1A1 |
|  | M1A1 |
|  |  |
| Solving, | dM1 |
|  | A1 |
| **OR** |  |
| => *a* = 2 | M1 A1 |
|  |  |
| AND | M1A1 |
|  | dM1A1 |
|  |  | **(6)** |
|  |  | **(9 marks)** |
| **7(a)** | 40  30  0 *T* 25 | B1 shape (*M*)  B1 figs (40,*T*)  B1 shape (*N*)  B1 figs (30,25) |
|  |  | **(4)** |
| **7(b)** | **For N**:  **For M**: | M1 A1  dM1 A1  M1 A1  dM1 A1 |
|  |  | **(8)** |
|  |  | **(12 marks)** |
| **8(a)** |  | B1  B1  B1  20, 8, 25 |
|  |  | **(3)** |
| **8(b)** |  | M1 |
|  | A1 |
|  |  | **(2)** |
| **8(c)** | 1960 = (25 × 20) +(30 × 8) + (½ × 30 × 12) + (60 × 8) + 8 × *t* + ½ × *t* × 12 | M1A3 **ft**  (2 ,1, 0) |
| 1960 = 500 + 240 + 180 + 480 + 14*t* | DM1 A1 |
|  |  |
| *T* = 115 + 40 | DM1 |
| = 155 | A1 |
|  |  | **(8)** |
|  |  | **(13 marks)** |
| **9(a)** | 4  0  64  *V*  5  84 | B1 shape  B1 figs |
|  |  | **(2)** |
| **9(b)** | (½ × 4 × 5) + 60 × 5 | M1 A1 |
|  | A1 |
|  |  | **(3)** |
| **9(c)** |  | M1 A2 **ft** |
|  | dM1A1 |
|  |  | **(5)** |
| **9(d)** |  | M1A1 |
|  |  | **(2)** |
|  |  | **(12 marks)** |
| **10(a)** | Speed  Time  0  22  30  30+*T*  120  Shape  Figures | B1  B1 |
|  |  | **(2)** |
| **10(b)** |  | M1A1 |
|  | A1 |
|  |  | **(3)** |
| **10(c)** |  | M1A1 |
|  | A1 |
|  | A1 |
|  |  | **(4)** |
| **10(d)** |  | M1 |
| *a* = 0.79, 0.792, 99/125 oe | A1 |
|  |  | **(2)** |
|  |  | **(11 marks)** |
| **12(a)** |  | M1  A1 |
|  |  | (2) |
| **12(b)** |  | M1  A1  M1 A1  A1 |
|  |  | (5) |
| **12(c)** | triangle, *drawn on the diagram*, with base coinciding with base of | B1 |
|  | trapezium, top vertex above line *v* = 30 and meeting trapezium at least once | DB1 |
|  |  | (2) |
| **12(d)** | *V* marked correctly | M1  A1  A1  M1 A1  A1 |
|  | (oe) or 42 (or better) |  |
|  |  | (6) |
|  |  | **(15 marks)** |
| **13(a)** |  | M1 M(A)1 |
|  | *u =* 17 ½ 🞸 | A1 |
|  |  | (3) |
| **13(b)** |  | M1 |
|  |  | A1 |
|  |  | (2) |
| **13(c)** |  | M1 |
|  |  | A1 |
|  |  | DM1 |
|  | *t* = 3.142.. (22/7) or 0.428…(3/7) | A1 |
|  |  | DM1 A1 (6) |
|  |  | **(11 marks)** |
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| **14** |  |  |
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| **15** |  | M1 A2  A1 (4) |
|  | Finding *u* ( = 6 ) | M1  M1  A1  **DM**1  A1 (5)  **9** |
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| **16(a)** |  | M1 |
|  |  | A1 |
|  |  | (2) |
|  |  |  |
|  |  |  |
| **16(b)** |  |  |
|  | Shape | B1 |
|  | 15, *T* | B1 |
|  |  | (2) |
|  |  |  |
|  |  |  |
| **16(c)** | ft their 6 | M1 A1ft |
|  |  |  |
|  |  | M1 A1 |
|  |  | (4) |
| **16(d)** | ,0.9375, 0.938, 0.94 | M1 A1 |
|  |  | (2) |
|  |  |  |
| **16(e)** | 3 horizontal lines | B1 |
|  | Correctly placed;no cts vert line | B1 |
|  | , ft their | B1 |
|  |  | (3) |
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|  |  | **(13 marks)** |
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| **17(a)** | *V* | B1 (shape)  B1 (*V*)  (2) |
| **17(b)** |  | M1 A1; A1  M1 A1 (5) |
|  |  | M1 A1 ft  A1  M1 A1  A1 (6) |
|  |  | **(13 marks)** |
| **18(a)** |  | M1 A1 |
|  | Leading to  🞹 cso | A1 **(3)** |
|  |  |  |
| **18(b)** |  | M1 A1 |
|  |  |  |
|  |  |  |
|  | *t* = 2.99 or 3.0  *t* = 1.30 or 1.3 | DM1 A1 A1  **(5)** |
|  |  |  |
| **18(c)** | N2L | M1 A1 |
|  |  |  |
|  |  |  |
|  | Leading to  or 0.32 | M1 A1 **(4)** |
|  |  | **[12]** |
|  |  |  |
| **19(a)** | 4 N  1 N  2 N  *T* N  *T* N |  |
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|  |  |  |
|  | For system N2L | M1 A1 |
|  | , 1.3 | A1 **(3)** |
|  |  |  |
| **19(b)** |  | M1 A1 **(2)** |
|  |  |  |
| **19(c)** | For *P* N2L  ft their *a* | M1 A1ft |
|  | 1.38, 1.4 | A1 **(3)** |
|  | **OR** For *Q* N2L 4 - 2 – *T* = 0.5 x 1.25 |  |
|  | 1 N  2 N |  |
|  |  |  |
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| **19(d)** | For system N2L | M1 A1 |
|  |  | M1 |
|  |  | A1 **(4)** |
|  |  |  |
| **19(e)** | For *P* N2L | M1 A1 |
|  | , 0.13 | A1 **(3)** |
|  |  | **(15 marks)** |
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|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | M1 2011 | 1 |  | Kinematics of a particle moving in a straight line | 1.1b, 3.1b |
| 2 | M1 2015 | 2 |  | Kinematics of a particle moving in a straight line | 1.1b, 3.1b |
| 3 | M1 2014R | 4 |  | Kinematics of a particle moving in a straight line | 1.1b, 3.1b |
| 4 | M1 2014R | 3 |  | Kinematics of a particle moving in a straight line | 1.1a, 1.1b, 2.1, 3.1b |
| 5 | M1 2013R | 4 |  | Kinematics of a particle moving in a straight line | 1.1b, 2.1, 3.1b |
| 6 | M1 2013 | 4 |  | Kinematics of a particle moving in a straight line | 1.1b, 3.1b |
| 7 | M1 2016 | 4 |  | Kinematics of a particle moving in a straight line | 1.1a, 1.1b, 2.1, 3.1b, 3.3 |
| 8 | M1 2012 | 4 |  | Kinematics of a particle moving in a straight line | 1.1a, 1.1b, 2.2a, 3.1b |
| 9 | M1 2011 | 4 |  | Kinematics of a particle moving in a straight line | 1.1b, 2.2a, 3.1b |
| 10 | M1 2013 | 5 |  | Kinematics of a particle moving in a straight line | 1.1a, 1.1b, 2.1, 3.1b, 3.3 |