| **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)** |  | M1A1 |
|  |  | **(2)** |
| **2(b)** |  | M1A1dM1A1A1 |
|  |  | **(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)** |  | B10 < *t* < 50B150 < *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 ftA1 |
|  |  | **(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 A1dM1 A1M1 A1dM1 A1 |
|  |  | **(8)**  |
|  |  | **(12 marks)** |
| **8(a)** |    | B1B1B120, 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)** | 4064*V*584 | B1 shapeB1 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 Time0223030+*T*120ShapeFigures | B1B1 |
|  |  | **(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 A1M1 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 ) | M1M1 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; A1M1 A1 (5) |
|  |  | M1 A1 ftA1M1 A1A1 (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]** |
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| **19(a)** | 4 N1 N2 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 N2 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 |