| **Question** | **Scheme** | **Marks** |
| --- | --- | --- |
| **1(a)** |  | M1 |
|  | M1 |
| or | A1 |
|  |  | **(3)** |
| **1(b)** | ,  (m s-1) | B1 |
| *a* = 4*t* – 14 = 0 | M1 |
| , | M1A1 |
| Max speed = 20 ms-1 | A1 |
|  |  | **(5)** |
| **1(c)** |  | M1A1 |
| Distance = | M1A1 |
|  |  |
| = 24 (m) | A1 |
|  |  | **(5)** |
|  |  | **(13 marks)** |
| **2(a)** |  | M1 |
|  |  |
|  | DM1 |
|  | A1 A1 |
|  |  | **(4)** |
| **2(b)** |  | M1 |
|  | A1 |
|  | DM1 |
|  |  |
|  | A1 |
|  |  |
|  | A1 |
|  |  | **(5)** |
|  |  | **(9 marks)** |
| **3(a)** | *a* = 4*t*3 – 12*t* |  |
| Convincing attempt to integrate | M1 |
| *v* = *t* 4 – 6 *t* 2 (+ *c*) | A1 |
| Use initial condition to get *v* = *t* 4 – 6 *t* 2 + 8 (m s–1) | A1 |
|  |  | **(3)** |
|  |  |  |
| **3(b)** | Convincing attempt to integrate | **M1** |
| Integral of their *v* | **A1ft** |
|  |  | **(2)** |
| **3(c)** | Set their *v* = 0 | M1 |
| Solve a quadratic in *t*2 | dM1 |
| at rest when *t* = , *t* = 2 | A1 |
|  |  | **(3)** |
|  |  | **(8 marks)** |
| **4(a)** | At rest when : | M1 |
| , | DM1 |
| , 4 | A1 |
|  |  | **(3)** |
| **4(b)** |  | M1 |
|  | A1 |
| , (m s-2) | A1 |
|  |  | **(3)** |
| **4(c)** | (+*C*) | M1 A1 |
| Use of ,  ,  ,  (and ,) as limits in integrals | dM1 |
|  | A1 |
| (0,  , ,  )  (m) | A1 |
|  |  | **(5)** |
|  |  | **(11 marks)** |
| **5(a)** | *O*  *P*  *m* |  |
|  |  |
|  | M1 A1 |
|  | M1 |
|  | A1 |
|  |  | **(4)** |
| **5(b)** |  | M1 |
|  | DM1 |
|  | A1 |
|  |  | **(3)** |
| **5(c)** |  | M1 A1 ft |
|  | DM1 |
|  |  |
|  |  |
|  | A1 |
|  |  | **(4)** |
|  |  | **(11 marks)** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | M2 2013 | 3 |  | Kinematics of a particle moving in a straight line or plane | 1.1a, 2.1, 2.2a, 3.1a |
| 2 | M2 2013R | 3 |  | Kinematics of a particle moving in a straight line or plane | 1.1a, 1.1b, 2.1, 3.1a |
| 3 | M2 Jan 2011 | 3 |  | Kinematics of a particle moving in a straight line or plane | 1.1b, 2.2a, 3.1a |
| 4 | M2 2015 | 6 |  | Kinematics of a particle moving in a straight line or plane | 1.1a, 1.1b, 2.1, 3.1a |
| 5 | M2 2011 | 6 |  | Kinematics of a particle moving in a straight line or plane | 1.1a, 2.2a, 3.1a |