| **Question** | **Scheme** | **Marks** |
| --- | --- | --- |
| **1** |  | B1 |
|  | M1 A2 |
|  (2.5) | A1 |
|  |  | **(5 marks)** |
| **2(a)** | Tractive force =  | B1 |
|  | M1 |
| (=882.5) | A1ft |
|  | A1 |
|  |  | **(4)** |
| **2(b)** | T F =  |  |
|  | M1 |
| A2 |
| (= 0.4166….) |  |
|  | A1 |
|  |  |  **(4)** |
|  |  | **(8 marks)** |
| **3(a)** | *F* – 150 – 300 = 1500 × 0.2 | M1 |
| A1 |
|  | A1 |
|  | M1 |
| A1 |
|  |  | **(5)** |
| **3(b)** | Use their mass as a guide to which of these two alternatives is being used. |  |
|  | M1 |
|  | A1 |
|  |  | **(2)** |
|  |  | **(7 marks)** |
| **4** | 1000*g* N500 N*T* |  |
|  | M1 |
|  | M1 A1 |
|  |  |
|  | DM1 A1 |
|  |  | **(5 marks)** |
| **5(a)** | Constant speed no acceleration.Driving force  | M1 |
| **or**  **and**  | A1 |
| A1 |
|  |  |
|  | M1 |
|   | A1 |
|  |  | **(5)** |
| **5(b)** |   | M1 |
| A1ft |
|  m s-2 | A1 |
|  |  | **(3)** |
| **5(c)** |  | M1 |
| A1 |
|   | A1 |
|  m (79.1) | A1 |
|  |  | **(4)** |
|  |  | **(12 marks)** |
| **6(a)** |    | M1 |
| A1 |
|    | A1 |
|  or    or  | B1 |
|  ,  | M1 |
|  (500g), (80g) | A1 |
|  |  | **(6)** |
| **6(b)** | **Must be using work-energy.** |  |
| KE lost = PE gained + WD against R | M1 |
|  | A1 |
|  | A1ft |
|  (m) | A1 |
|  |  | **(4)** |
|  |  | **(10 marks)** |
| **7(a)** | Work done =  | M1 M1 |
|  = (J)  | A1 |
|  |  | **(3)** |
| **7(b)** | Energy: WD against *F* + GPE + final KE = initial KE |  |
|   | M1A2ft |
|  (m s -1) | A1 |
|  |  | **(4)** |
|  |  | **(7 marks)** |
| **8** | NB This question tells candidates to use work-energy - suvat approach scores 0/6 |  |
|  | B1 B1 B1 |
|  | M1 |
| A1 |
|  | A1 |
|  |  | **(6 marks)** |
| **9(a)** |  |  |
| Constant speed  | M1 |
| A2 |
|   | M1 |
|   | A1  |
|  |  | **(5)** |
| **9(b)** |  | M1 |
| A2 |
| : (m s-2) | A1 |
|  |  | **(4)** |
|  |  | **(9 marks)** |
| **10(a)** |  | M1 |
|   | A1 |
|  | M1 A1 |
|  | DM1 |
|   | A1 |
|  |  | **(6)** |
| **10(b)** |  3 terms  | M1 |
|  -1 ee  | A2,1,0 |
| , | DM1 |
| . | A1 |
|  |  | **(5)** |
|  |  | **(11 marks)** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | M2 2015 | 1 |  2.1 | Work and energy | 1.1b, 3.1b, 3.3, 3.4 |
| 2 | M2 2014R | 1 |  2.1 | Work, energy and power | 1.1b, 3.1b, 3.4 |
| 3 | M2 2013R | 1 |  2.1 | Kinematics of a particle moving in a straight line or plane, Power | 1.1b, 2.2a, 3.1b |
| 4 | M2 2011 | 1 |  2.1 | Power | 1.1b, 3.1b |
| 5 | M2 2017 | 2 |  2.1 | Power and work-energy | 1.1b, 3.3, 3.4 |
| 6 | M2 2016 | 2 |  2.1 | Power | 1.1b, 2.2a, 3.1b, 3.3, 3.4 |
| 7 | M2 2013 | 2 |  2.1 | Work and power | 1.1b, 1.2, 2.1, 2.2a, 3.1b, 3.4 |
| 8 | M2 2013R | 2 |  2.1 | Work and energy | 1.1b, 3.1b, 3.4 |
| 9 | M2 2014 | 4 |  2.1 | Work and energy | 1.1b, 2.1, 3.1b, 3.3, 3.4 |
| 10 | M2 Jan 2011 | 4 |  2.1 | Work and energy | 1.1b, 2.2a, 3.1b, 3.4 |