| **Question** | **Scheme** | **Marks** |
| --- | --- | --- |
| **1(a)** |  | M1  A1 A1 |
|  |  | **(3)** |
| **1(b)** |  | M1 A1  A1 |
|  |  | **(3)** |
| **1(c)** | Equate their **j** components: | M1  A1  M1  A1 |
|  |  | **(4)** |
|  |  | **(11 marks)** |
| **2(a)** | (4**i** – 2**j**) + (2**i +** *q***j**) = (6**i** + (*q* – 2)**j**) | M1A1 |
| ratio 2:1 | **DM**1 |
|  | A1 |
|  |  | **(4)** |
| **2(b)** | 6**i** + 3**j** = 1.5**a** | M1 |
| **a** = (4**i** + 2**j**) m s-2 | A1 |
| **v** = **u** + **a**t = (-2**i** + 4**j**) + 2(4**i** + 2**j**) | M1 |
| = 6**i** + 8**j** | A1**ft** |
|  | **M**1  A1 |
|  |  | **(6)** |
|  |  | **(10 marks)** |
| **3(a)** | **:** 3**i –** 2**j = 0**.5***a*** | M1 |
| ***a* =** 6**i –** 4**j** | A1 |
| **(m s-2) \*\*** | M1A1 |
|  |  | **(4)** |
| **3(b)** | ***v* =*u* + *a****t***: *v* = (i +** 3**j) +** 2**(**6**i –** 4**j)** | M1A1 **ft** |
| **=** 13**i –** 5**j** m s-1 | A1 |
|  |  | **(3)** |
| **3(c)** | Distance **= (m)** | M1A1 |
|  |  | **(2)** |
|  |  |  |
| **3(d)** | When **,** velocity of *P* is | M1A1 **ft** |
| Given conclusion reached correctly. E.g. | A1 |
|  |  | **(3)** |
|  |  | **(12 marks)** |
| **4(a)** |  |  |
| Resolve and use Pythagoras |  |
| (*X* – 20cos60)2 + (20cos30)2 = (3*X*)2 | M1 A1 |
|  | A1 |
| **(3 SF)** | M1A1 |
|  |  | **(5)** |
| **4(b)** |  | M1A1 |
| (N) (**3SF**) | **DM1** A1 |
|  |  | **(4)** |
|  |  | **(9 marks)** |
| **5(a)** |  | B1  M1  **DM**1 A1  **DM**1 A1 A1 |
|  |  | **(7)** |
| **5(b)** |  | M1  A1  M1 A1 **cso** |
|  |  | **(4)** |
|  |  | **(11 marks)** |
| **6(a)** |  | M1 A1 A1 |
|  |  | **(3)** |
| **6(b)** |  | M1 A1  A1 |
|  |  | **(3)** |
| **6(c)** |  | M1 A1 |
|  |  | **(2)** |
| **6(d)** |  | M1  A1  M1  M1  A1 A1 |
|  |  | **(6)** |
|  |  | **(14 marks)** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | M1 2016 | 1 |  | Vectors in mechanics | 1.1b, 2.2a, 3.1b |
| 2 | M1 2014R | 2 |  | Vectors in mechanics | 1.1b, 3.1a, 3.1b |
| 3 | M1 2014 | 5 |  | Vectors in mechanics | 1.1b, 2.1, 3.1b |
| 4 | M1 2014 | 6 |  | Vectors in mechanics | 1.1b, 3.1a |
| 5 | M1 2016 | 7 |  | Vectors in mechanics | 1.1b, 3.1a |
| 6 | M1 2017 | 7 |  | Vectors in mechanics | 1.1b, 2.1, 3.1b |