

| Question |     |  | Answer                                                                                                                                                                          | Marks                                                         | AO                                               | Guidance                                                                                                                                          |                                                                                                                                              |
|----------|-----|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 11       | (a) |  | Using $s = \frac{1}{2}(u + v)t$ with $u = 0, v = 9, t = 5$<br><br>$s = \frac{1}{2}(0 + 9)5 = 22.5 \text{ m}$                                                                    | <b>M1</b><br><br><b>A1*</b><br><br>[2]                        | <b>3.4</b><br><br><b>1.1b</b>                    | Allow for any sequence of <i>suvat</i> equations leading to a value for <i>s</i> ( $a = 1.8$ may be seen)                                         |                                                                                                                                              |
| 11       | (b) |  | Substituting $t = 5, v = 9$ into $v = 0.05t^3 + kt$<br>$9 = 0.05 \times 5^3 + 5k$<br>$k = 0.55$                                                                                 | <b>M1</b><br><b>A1</b><br>[2]                                 | <b>3.3</b><br><b>1.1b</b>                        | Uses $t = 5, v = 9$ to form an equation for <i>k</i>                                                                                              |                                                                                                                                              |
| 11       | (c) |  | $a = \frac{dv}{dt} = 0.15t^2 + k$<br><br>When $t = 5, a = 0.15 \times 5^2 + k = 4.3 \text{ ms}^{-2}$                                                                            | <b>M1</b><br><br><b>A1</b><br><br>[2]                         | <b>3.4</b><br><br><b>1.1b</b>                    | Differentiation of their model B<br><br>FT their <i>k</i>                                                                                         |                                                                                                                                              |
| 11       | (d) |  | $\int_0^5 v dt = \int_0^5 (0.05t^3 + 0.55t) dt$<br><br>distance 14.6875 m (14.7 m)<br><br>Model B distance 14.7 is closer to 16 m than model A (22.5 m) so B models this better | <b>M1</b><br><br><b>A1*</b><br><br><b>E1 (dep)</b><br><br>[3] | <b>3.4</b><br><br><b>1.1a</b><br><br><b>3.5a</b> | Definite integral oe<br><br>FT their <i>k</i><br>BC acceptable<br>Comment which quotes at least two values. Dependent on both A marks indicated * | Do not allow for<br>$s = 0.05 \frac{t^4}{4} + 0.55 \frac{t^2}{2} + c$<br><br>unless limits used, or there is an attempt to evaluate <i>c</i> |