9	**(a)**		$\mathbf{a} = \frac{\mathrm{d}\mathbf{v}}{\mathrm{d}t} = 2k\mathbf{i} + 6\mathbf{j}$ When $t = 2$, $\mathbf{a} = 2 \times 2k\mathbf{i} + 6\mathbf{j}$ $\lvert\mathbf{a}\rvert = \sqrt{(4k)^2 + 6^2} = 10$ giving $16k^2 + 36 = 100$ So $k = 2$	**M1** **M1** **M1** **A1** **[4]**	**3.1a** **1.1b** **3.1a** **3.2a**	differentiating the **v** vector substituting t = 2 into their **a** vector Equate the magnitude of their **a** vector to 10 must choose the positive value if two values seen
9	**(b)**		$\mathbf{r} = \int \mathbf{v}\ \mathrm{d}t = \frac{kt^3}{3}\mathbf{i} + 3t^2\mathbf{j} + \mathbf{c}$ particle at the origin when t = 0 so $\mathbf{c} = \mathbf{0}$ So $\mathbf{r} = \frac{kt^3}{3}\mathbf{i} + 3t^2\mathbf{j} = \left[\frac{2t^3}{3}\mathbf{i} + 3t^2\mathbf{j}\right]$	**M1** **A1** **[2]**	**1.1a** **1.1b**	integrating with their k or general k. Allow for a vector or for both components separately integrated. Condone missing +**c** or +**c** still in their answer FT their k if positive or general k used Must be in vector form
9	**(c)**		Northeast when the **i** component = **j** component $\frac{2t^3}{3} = 3t^2$ giving $t = 4.5$ s [t = 0 rejected as the particle is at the origin]	**M1** **A1** **[2]**	**3.1b** **1.1b**	FT their **r** www