5 **(a)** Find the vector which is in the opposite direction to $\begin{pmatrix} 15 \\ -8 \end{pmatrix}$ and has a magnitude of 8.5. [2]

(b) Find the values of a and b such that $5\begin{pmatrix} 3a \\ b \end{pmatrix} + \begin{pmatrix} 2a+1 \\ 2 \end{pmatrix} = 6\begin{pmatrix} b+a \\ 2 \end{pmatrix}$. [3]

6 **(a)** Write down the values of k for which the line $y = k$ is a tangent to the curve $y = 4\sin\left(x + \frac{\pi}{4}\right) + 10$. [2]

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(b) (i) Show that $\frac{1+\tan\theta}{1-\cos\theta}+\frac{1-\tan\theta}{1+\cos\theta}=\frac{2(1+\sin\theta)}{\sin^2\theta}$. [4]

(ii) Hence solve the equation $\frac{1+\tan\theta}{1-\cos\theta}+\frac{1-\tan\theta}{1+\cos\theta}=3$, for $0° \leqslant \theta \leqslant 360°$. [4]