**13.** The curve $C$ has parametric equations

$$x = 2\cos t, \quad y = \sqrt{3}\cos 2t, \quad 0 \leqslant t \leqslant \pi$$

(a) Find an expression for $\dfrac{dy}{dx}$ in terms of $t$.

(2)

The point $P$ lies on $C$ where $t = \dfrac{2\pi}{3}$

The line $l$ is the normal to $C$ at $P$.

(b) Show that an equation for $l$ is

$$2x - 2\sqrt{3}y - 1 = 0$$

(5)

The line $l$ intersects the curve $C$ again at the point $Q$.

(c) Find the exact coordinates of $Q$.

You must show clearly how you obtained your answers.

(6)