7. The parabola C has equation $y^2 = \frac{4}{3}x$

The point $P\left(\frac{1}{3}t^2, \frac{2}{3}t\right)$, where $t \neq 0$, lies on C.

(a) Use calculus to show that the normal to C at P has equation

$$3tx + 3y = t^3 + 2t$$

(3)

The normal to C at the point where $t = 9$ meets C again at the point Q.

(b) Determine the exact coordinates of Q.

(4)

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Question 7 continued

(Total for Question 7 is 7 marks)