6. The rectangular hyperbola H has equation $xy = 100$

The point $P\left(10t, \frac{10}{t}\right)$, where $t \neq 0$, lies on H.

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

$$t^3x - ty = 10\left(t^4 - 1\right)$$

(4)

The normal to H at P meets the y-axis at the point Q.

Given that the area of triangle OPQ, where O is the origin, is 750

(b) determine both possible pairs of coordinates of the point P.

(5)

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Question 6 continued

(Total for Question 6 is 9 marks)