Leave blank

8. A rectangular hyperbola, H, has Cartesian equation $xy = 16$

The point $P\left(4t, \frac{4}{t}\right)$, $t \neq 0$, lies on H.

(a) Use calculus to show that an equation of the normal to H at P is

$$ty - t^3x = 4 - 4t^4$$

(5)

The point A on H has parameter $t = 2$

The normal to H at A meets H again at the point B.

(b) Determine the exact value of the length of AB.

(6)

The tangent to H at A meets the y-axis at the point C.

(c) Determine the exact area of triangle ABC.

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Leave blank

Question 8 continued

Leave blank

Question 8 continued

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Leave blank

Question 8 continued

Q8

(Total 14 marks)