5.

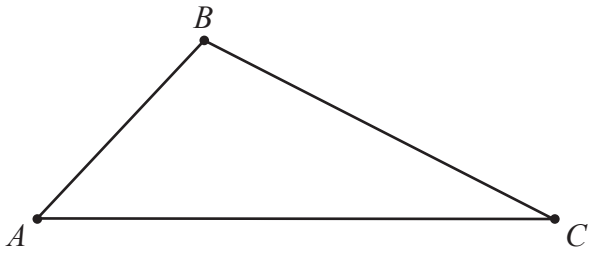

Diagram **NOT** accurately drawn

Figure 1

Figure 1 shows a sketch of triangle ABC.

Given that

- $\overrightarrow{AB} = 2\mathbf{i} + 3\mathbf{j} - 2\mathbf{k}$
- $\overrightarrow{AC} = 6\mathbf{i} - 2\mathbf{j} - 8\mathbf{k}$

(a) find the size of angle BAC, giving the answer, in degrees, to one decimal place.

(3)

(b) Hence find the area of triangle ABC, giving the answer to one decimal place.

(2)

The line AB is extended to a point D such that angle ADC is a right angle.

(c) Find $\overrightarrow{AD}$

(4)

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Question 5 continued

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Question 5 continued

(Total for Question 5 is 9 marks)

6.

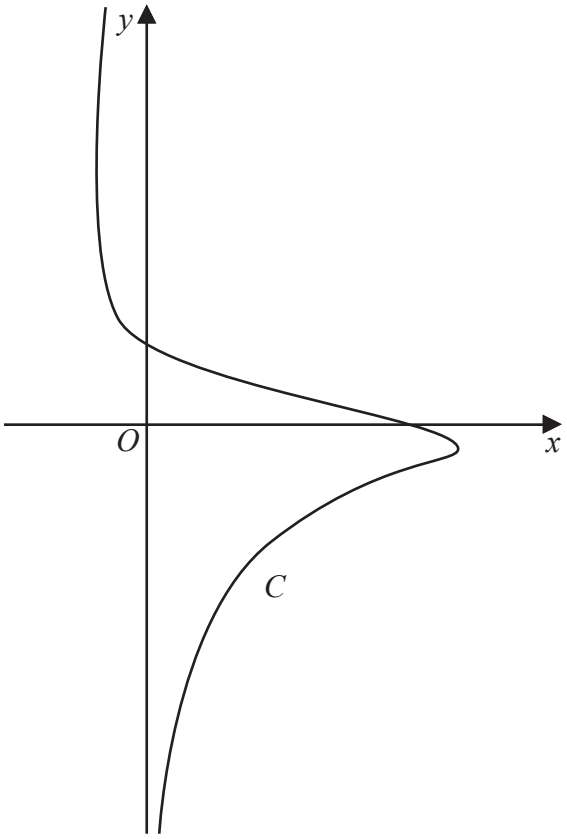

Figure 2

Figure 2 shows a sketch of the curve C with equation

$$4xy^2 + 12y + 6x = 53 \qquad y \in \mathbb{R}$$

(a) Use implicit differentiation to find $\frac{dy}{dx}$ in simplest form in terms of x and y.

(5)

The point $P(a, b)$ lies on C.

Given that a is the maximum possible value of x

(b) find the value of a and the value of b.

(*Solutions relying on calculator technology are not acceptable.*)

(5)

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