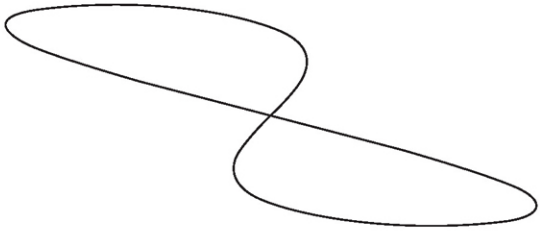
11 The route for a long-distance running race is shown in **Figure 1**.

Figure 1



The shape of the route can be modelled by the equation

$$y^4 = 4y^2 - x^2 - 3xy$$

where x and y are measured in kilometres.

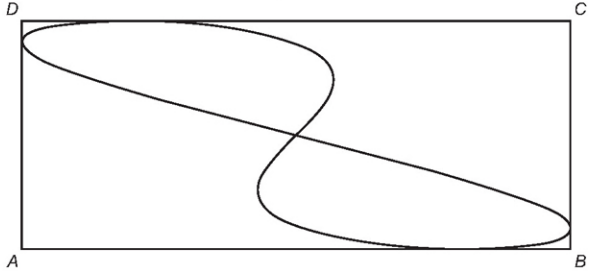
11 (a) Show that

$$\frac{dy}{dx} = \frac{2x+3y}{8y-3x-4y^3}$$

[5 marks]

11 (b) The route of the long-distance running race is contained within an area of land in the shape of a rectangle *ABCD*, as shown in **Figure 2**.

Figure 2



The route just touches each side of the rectangle.

The side *AB* of the rectangle is parallel to the x-axis.

The side *AB* has a length of approximately 12 km.

Show that the area of the land required is approximately 60 km^2.

Fully justify your answer.

[6 marks]