11.

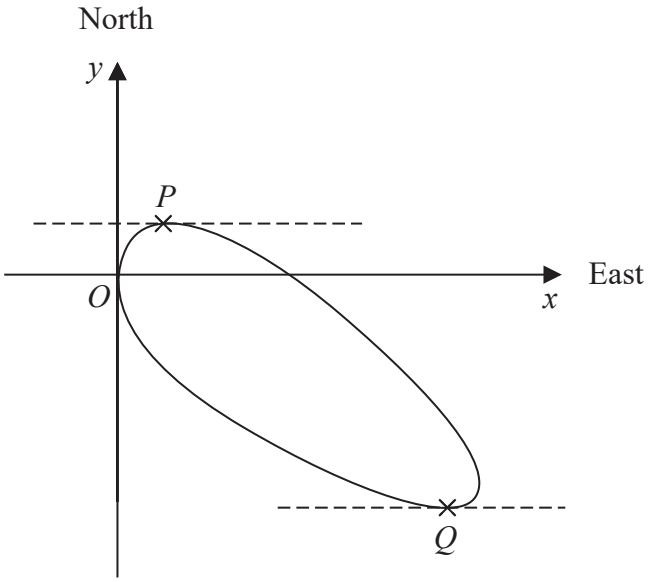


Figure 4

Figure 4 shows a sketch of the closed curve with equation

$$(x + y)^3 + 10y^2 = 108x$$

(a) Show that

$$\frac{dy}{dx} = \frac{108 - 3(x + y)^2}{20y + 3(x + y)^2}$$

(5)

The curve is used to model the shape of a cycle track with both x and y measured in km.

The points P and Q represent points that are furthest north and furthest south of the origin O, as shown in Figure 4.

Using the result given in part (a),

(b) find how far the point Q is south of O. Give your answer to the nearest 100 m.

(4)

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Question 11 continued

Question 11 continued

(Total for Question 11 is 9 marks)

TOTAL FOR PAPER IS 75 MARKS

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