STATIONARY POINTS : 2

(133) The curve C has equation

$$y = x^3 + kx^2 - 9x - 10,$$

where k is a constant. The two stationary points on the graph of C are denoted by Q and R. The x-coordinate of Q is -1.

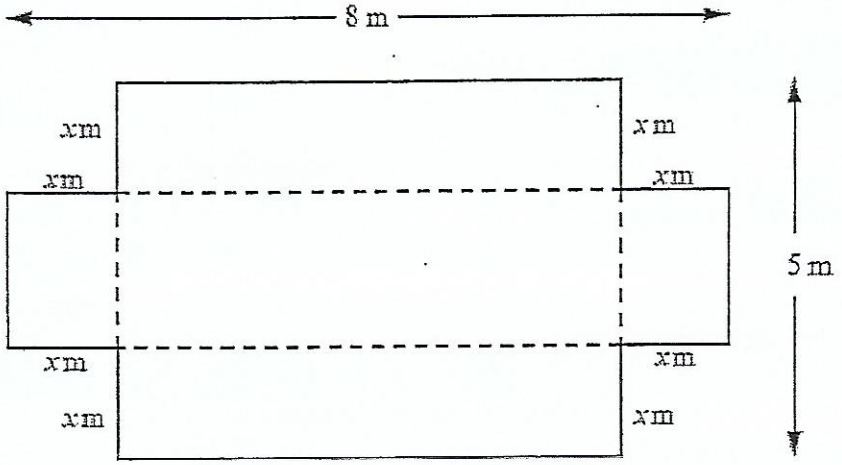
(a) Find $\frac{dy}{dx}$ and hence show that $k = -3$. [3]

(b) Find the x-coordinate of R. [2]

(c) Determine the nature of each of the stationary points Q and R. [2]

Jan 11

(134) A rectangular sheet of metal has length 8 m and width 5 m. Four squares, each of side x m, where $x < 2{\cdot}5$, have been cut away from the corners of the rectangular sheet, as shown in the diagram below. The rest of the metal sheet is now bent along the dotted lines to form an open tank in the form of a cuboid.



(a) Show that the volume V m^3 of this tank is given by

$$V = 4x^3 - 26x^2 + 40x.$$ [2]

(b) Find the maximum value of V, showing that the value you have found is a maximum value. [5]

June 11

(135) The curve C has equation

$$y = x^3 - 6x^2 + 12x - 9.$$

(a) Show that C has only one stationary point. Find the coordinates of this point. [4]

(b) Verify that this stationary point is a point of inflection. [2]

Jan 12