

# 9-9.2-27

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## Question:

Find the area bounded by the curve  $4y = 3x^2$  and the line  $2y = 3x + 12$ .

## Solution:

Information	Equation
Parabola	$4y = 3x^2$
Line	$2y = 3x + 12$

TABLE 0: Information

The given curve can be expressed as a conic of parameters

$$v = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}, u = \begin{pmatrix} 0 \\ -\frac{2}{3} \end{pmatrix}, f = 0 \quad (0.1)$$

The given line parameters are

$$h = \begin{pmatrix} 0 \\ 6 \end{pmatrix}, m = \begin{pmatrix} 1 \\ \frac{3}{2} \end{pmatrix} \quad (0.2)$$

From (??), the points of intersection of line and conic are

$$\mathbf{x}_1 = \begin{pmatrix} -2 \\ 3 \end{pmatrix}, \mathbf{x}_2 = \begin{pmatrix} 4 \\ 12 \end{pmatrix} \quad (0.3)$$

As you can see in the figure, the area bounded by the curve  $4y = 3x^2$  and the line  $2y = 3x + 12$  is given by

$$\int_{-2}^4 \left( \frac{3x + 12}{2} - \frac{3x^2}{4} \right) dx = 27 \quad (0.4)$$

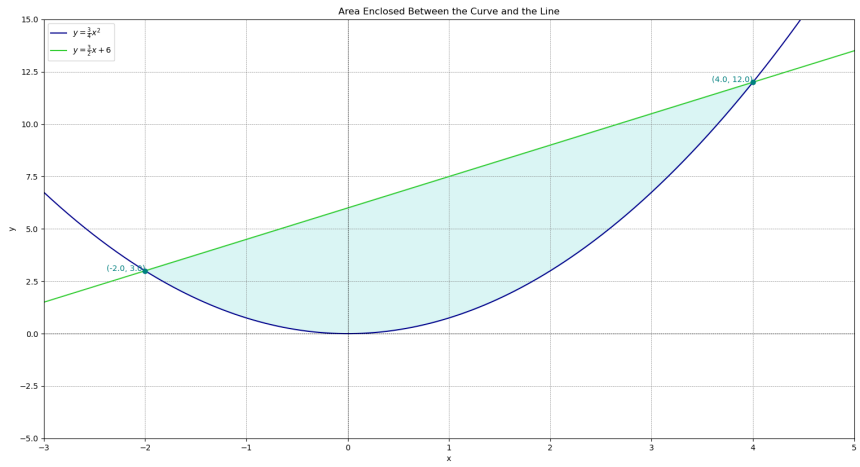


Fig. 0.1: Area Enclosed