06	9a	Find the coordinates of the focus of the parabola $12y = x^2 - 6x - 3$.	2

$$12y = x^2 - 6x - 3$$
$$x^2 - 6x = 12y + 3$$
$$x^2 - 6x + 9 = 12y + 3 + 9$$
$$(x - 3)^2 = 12y + 12$$
$$(x - 3)^2 = 12(y + 1)$$

which is of the form of $(x - h)^2 = 4a(y - k)$

Vertex $(3, -1)$ with $a = 3$.

$\therefore$ the coordinates of the focus is $(3, 2)$.

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

Finding the vertex of the parabola proved difficult for the majority of candidates. Those who had the most success completed the square. Candidates who used the axis of symmetry to find the x-value often had problems finding the y-coordinate of the vertex. Of those who found the correct vertex, most were then able to find the correct focus.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/