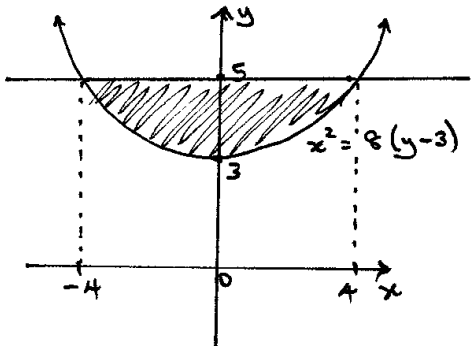
08	4c	Consider the parabola $x^2 = 8(y - 3)$. (iv) Calculate the area bounded by the parabola and the line $y = 5$.	3

$x^2 = 8(y - 3)$

$x^2 = 8y - 24$

$8y = x^2 + 24$

$y = \frac{1}{8}(x^2 + 24)$



$$\text{Area} = 2 \times \left[5 \times 4 - \int_0^4 \frac{1}{8}(x^2 + 24)\, dx\right]$$

$$= 2 \times \left[20 - \frac{1}{8}\left[\frac{x^3}{3} + 24x\right]_0^4\right.$$

$$= 2 \times \left[20 - \frac{1}{8}\left[\frac{4^3}{3} + 24 \times 4 - 0\right]\right.$$

$$= 10\frac{2}{3}$$

$\therefore$ area of $10\frac{2}{3}$ unit^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

(iv) Most candidates were aware that the solution involved integration. The most concise and successful approach involved finding the area with respect to the x-axis and using the symmetry of the function. Common errors included the use of incorrect limits, the interpretation of the question as the volume of a solid of revolution, incorrect algebra and forgetting to use subtraction of areas when working with respect to the x-axis. Candidates choosing to evaluate their area with respect to the y-axis encountered a more difficult integral and made more algebraic errors when attempting to evaluate.

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