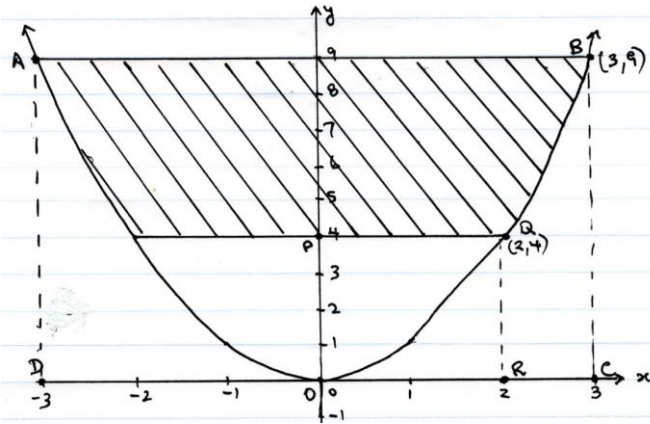


- TG 9** Sketch the region bounded by the curve  $y = x^2$  and the lines  $y = 4$ ,  $y = 9$ .  
**ADI** Evaluate the area of this region.



Method 1:

As  $y = x^2$ , then  $x = \sqrt{y}$  and find the area between the curve and the y-axis:

$$\begin{aligned}
 \text{Area} &= 2 \int_4^9 \frac{1}{2} y^{\frac{1}{2}} dy \\
 &= 2 \left[ \frac{2y^{\frac{3}{2}}}{\frac{3}{2}} \right]_4^9 \\
 &= \frac{4}{3} \left[ y^{\frac{3}{2}} \right]_4^9 \\
 &= \frac{4}{3} \left[ 9^{\frac{3}{2}} - 4^{\frac{3}{2}} \right] \\
 &= \frac{4}{3} (27 - 8) \\
 &= 25 \frac{1}{3} \quad \therefore \text{area is } 25 \frac{1}{3} \text{ units}^2.
 \end{aligned}$$

Method 2:

Shaded area

$$\begin{aligned}
 &= \text{Area } ABCD - (2 \times \text{area } PQRO + 2 \times \int_2^3 x^2 dx) \\
 &= 9 \times 6 - 2(4 \times 2 + \left[ \frac{x^3}{3} \right]_2^3) \\
 &= 54 - 2(8 + \left[ \frac{3^3}{3} - \frac{2^3}{3} \right]) \\
 &= 54 - 2(8 + 6 \frac{1}{3}) \\
 &= 25 \frac{1}{3} \quad \therefore \text{area is } 25 \frac{1}{3} \text{ units}^2.
 \end{aligned}$$

\* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by NESA.

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