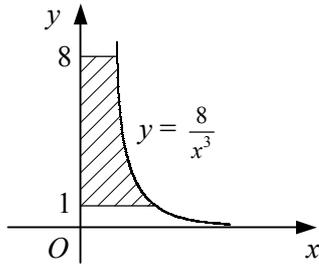


- 1  $f(x) \equiv 3 + 4x - x^2$ .
- Express  $f(x)$  in the form  $a(x + b)^2 + c$ , stating the values of the constants  $a$ ,  $b$  and  $c$ .
  - State the coordinates of the turning point of the curve  $y = f(x)$ .
  - Find the area of the region enclosed by the curve  $y = f(x)$  and the line  $y = 3$ .

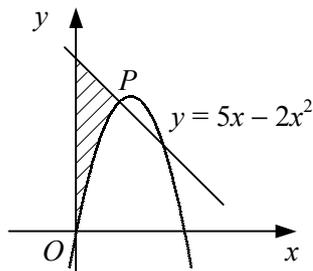
- 2 a Evaluate  $\int_1^2 \frac{8}{x^3} dx$ .



The diagram shows the curve with the equation  $y = \frac{8}{x^3}$ ,  $x > 0$ .

- Using your answer to part a, find the area of the shaded region bounded by the curve, the lines  $y = 1$  and  $y = 8$  and the  $y$ -axis.

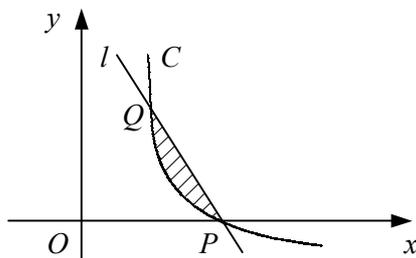
3



The diagram shows the curve  $y = 5x - 2x^2$  and the normal to the curve at the point  $P(1, 3)$ .

- Find an equation of the normal to the curve at  $P$ .
- The shaded region is bounded by the curve, the normal to the curve at  $P$  and the  $y$ -axis.
- Show that the area of the shaded region is  $\frac{5}{3}$ .

4



The diagram shows the curve  $C$  with the equation  $y = \frac{4-x^2}{x^2}$ ,  $x > 0$ , and the straight line  $l$ .

- Find the coordinates of the point  $P$  where  $C$  crosses the  $x$ -axis.
- The line  $l$  has gradient  $-3$  and intersects  $C$  at the points  $P$  and  $Q$ .
- Find the coordinates of the point  $Q$ .
  - Show that the area of the shaded region enclosed by  $C$  and  $l$  is  $\frac{1}{2}$ .