

1 Evaluate

a $\int_1^4 \frac{2}{x^2} dx$, (3)

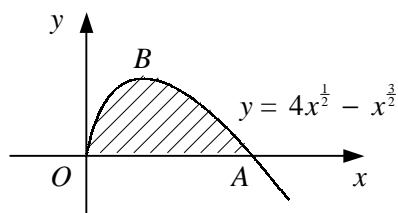
b $\int_0^2 (x-3)^2 dx$. (4)

3 $f(x) \equiv 3x^{\frac{1}{2}} - x^{-\frac{1}{2}}$.

a Find the value of $f(2)$, giving your answer in the form $k\sqrt{2}$ where k is an exact fraction. (2)

b Show that $\int_3^4 f(x) dx = 12 - 4\sqrt{3}$. (4)

4



The diagram shows the curve with the equation $y = 4x^{\frac{1}{2}} - x^{\frac{3}{2}}$.

The curve meets the x -axis at the origin, O , and at the point A .

a Find the coordinates of the point A . (2)

The curve has a maximum at the point B .

b Find the x -coordinate of the point B . (5)

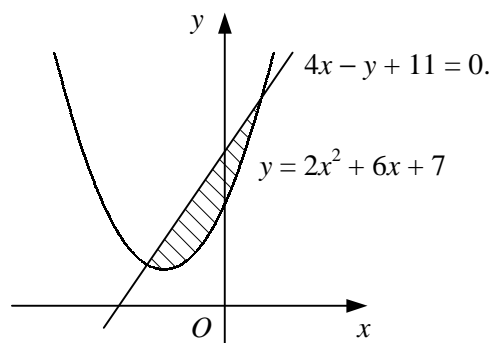
c Find the area of the shaded region enclosed by the curve and the x -axis. (4)

5 The curve $y = 4 + \frac{1}{x}$ crosses the x -axis at the point $(p, 0)$ and has an asymptote $y = q$.

a Write down the values of p and q . (2)

b Sketch the curve. (2)

6



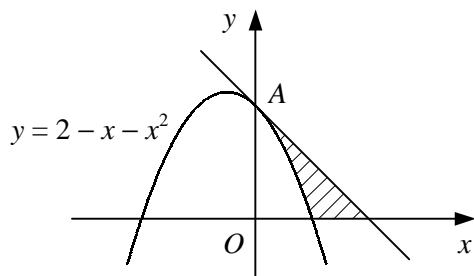
The diagram shows the curve with the equation $y = 2x^2 + 6x + 7$ and the straight line with the equation $4x - y + 11 = 0$.

- a** Find the coordinates of the points where the curve and line intersect. (5)
- b** Find the area of the shaded region enclosed by the curve and the line. (6)



- 8 a** Expand $(1 + \frac{x}{10})^{12}$ in ascending powers of x up to and including the term in x^3 , simplifying each coefficient in the expansion. (4)
- b** Using your series expansion from part **a**, find an estimate for $\int_0^1 (1 + \frac{x}{10})^{12} dx$. (5)

9



The diagram shows the curve with the equation $y = 2 - x - x^2$ and the tangent to the curve at the point A where it crosses the y -axis.

- a** Find an equation of the tangent to the curve at A . (4)
- b** Show that the area of the shaded region enclosed by the curve, the tangent to the curve at A and the x -axis is $\frac{5}{6}$. (9)