

- 1 a Expand $(1 - x)^{\frac{1}{2}}$, $|x| < 1$, in ascending powers of x up to and including the term in x^3 .
 b By substituting $x = 0.01$ in your expansion, find the value of $\sqrt{11}$ correct to 9 significant figures.
- 2 The series expansion of $(1 + 8x)^{\frac{1}{2}}$, in ascending powers of x up to and including the term in x^3 , is

$$1 + 4x + ax^2 + bx^3, |x| < \frac{1}{8}.$$
 a Find the values of the constants a and b .
 b Use the expansion, with $x = 0.01$, to find the value of $\sqrt{3}$ to 5 decimal places.
- 3 a Expand $(9 - 6x)^{\frac{1}{2}}$, $|x| < \frac{3}{2}$, in ascending powers of x up to and including the term in x^3 , simplifying the coefficient in each term.
 b Use your expansion with a suitable value of x to find the value of $\sqrt{8.7}$ correct to 7 significant figures.
- 4 a Expand $(1 + 6x)^{\frac{1}{3}}$, $|x| < \frac{1}{6}$, in ascending powers of x up to and including the term in x^3 .
 b Use your expansion, with $x = 0.004$, to find the cube root of 2 correct to 7 significant figures.
- 5 a Expand $(1 + 2x)^{-3}$ in ascending powers of x up to and including the term in x^3 and state the set of values of x for which the expansion is valid.
 b Hence, or otherwise, find the series expansion in ascending powers of x up to and including the term in x^3 of $\frac{1 + 3x}{(1 + 2x)^3}$.
- 6 Find the coefficient of x^2 in the series expansion of $\frac{2 + x}{\sqrt{4 - 2x}}$, $|x| < 2$.
- 7 a Find the values of A and B such that

$$\frac{2 - 11x}{1 - 5x + 4x^2} \equiv \frac{A}{1 - x} + \frac{B}{1 - 4x}.$$
 b Hence, find the series expansion of $\frac{2 - 11x}{1 - 5x + 4x^2}$ in ascending powers of x up to and including the term in x^3 and state the set of values of x for which the expansion is valid.
- 8
$$f(x) \equiv \frac{4 - 17x}{(1 + 2x)(1 - 3x)^2}, |x| < \frac{1}{3}.$$
 a Express $f(x)$ in partial fractions.
 b Hence, or otherwise, find the series expansion of $f(x)$ in ascending powers of x up to and including the term in x^3 .
- 9 The first three terms in the expansion of $(1 + ax)^b$, in ascending powers of x , for $|ax| < 1$, are

$$1 - 6x + 24x^2.$$
 a Find the values of the constants a and b .
 b Find the coefficient of x^3 in the expansion.