

**Self-assessment: 7 Binomial expansion**

1. Find the coefficient of the term indicated in each of the following expansions:

(a)  $x^3$  in  $(x - 2)^7$

(b)  $x^3y^7$  in  $(2x + 5y)^{10}$

(c)  $x^3$  in  $\left(x - \frac{1}{x}\right)^{13}$

[4 marks]

2. (a) Find the first three terms in the expansion of  $(2 - x)^5$ .

(b) By substituting a suitable value of  $x$ , find an approximation for  $1.99^5$  correct to five significant figures.

(accessible to students on the path to grade 3 or 4) [7 marks]

3. (a) Expand and simplify  $(1 + x)^4 + (1 - x)^4$ .

(b) Hence show that  $(\sqrt{2} + 1)^4 + (\sqrt{2} - 1)^4$  is an integer and find its value.

(accessible to students on the path to grade 5 or 6) [7 marks]

4. Number  $x$  satisfies the equation  $x^2 = 3x - 1$ .

(a) Show that  $x + \frac{1}{x} = 3$ .

*(accessible to students on the path to grade 3 or 4)*

(b) (i) Expand  $\left(x + \frac{1}{x}\right)^2$  and  $\left(x + \frac{1}{x}\right)^3$ .

(ii) Hence find the values of  $x^2 + \frac{1}{x^2}$  and  $x^3 + \frac{1}{x^3}$ .

*(accessible to students on the path to grade 5 or 6)*

(c) The constant term in the expansion of  $\left(x + \frac{1}{x}\right)^n$  is 70. Find the value of  $n$ .

*(accessible to students on the path to grade 7)*

*[12 marks]*