

Self-assessment: 8 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]