

The binomial expansion

Section test

- 1) Find the value of ${}^{12}C_3$.
- 2) Find the value of ${}^{15}C_{11}$.
- 3) In the expansion of $(a - b)^5$, find the term in a^2 and the term in b^4 .
- 4) In the expansion of $(x + 3)^8$, find the coefficient of x^3 , the coefficient of x^4 and the coefficient of x^6 .
- 5) In the expansion of $(2x - 1)^{30}$, find the coefficient of x^2 and the coefficient of x^3 .
- 6) Using the first three terms of the expansion of $(1 - 2x)^{12}$ and the substitution $x = 0.01$, find an approximate value for 0.98^{12} . Give your answer to four decimal places.

MEI C1 Polynomials 5 section test solutions

Solutions to Section test

$$1) {}^{12}C_3 = \frac{12 \times 11 \times 10}{1 \times 2 \times 3} = 220$$

$$2) {}^{15}C_{11} = {}^{15}C_4 = \frac{15 \times 14 \times 13 \times 12}{1 \times 2 \times 3 \times 4} = 1365$$

$$3) \text{Term in } a^2 = {}^5C_2 a^2 (-b)^3 = \frac{5 \times 4}{1 \times 2} a^2 \times -b^3 = -10a^2 b^3$$
$$\text{Term in } b^4 = {}^5C_1 a (-b)^4 = 5ab^4$$

$$4) \text{Term in } x^3 = {}^8C_3 \times x^3 \times 3^5 = \frac{8 \times 7 \times 6}{1 \times 2 \times 3} \times x^3 \times 3^5 = 13608x^3$$

Coefficient of x^3 is 13608.

$$\text{Term in } x^4 = {}^8C_4 \times x^4 \times 3^4 = \frac{8 \times 7 \times 6 \times 5}{1 \times 2 \times 3 \times 4} \times x^4 \times 3^4 = 5670x^4$$

Coefficient of x^4 is 5670

$$\text{Term in } x^6 = {}^8C_2 \times x^6 \times 3^2 = \frac{8 \times 7}{1 \times 2} \times x^6 \times 3^2 = 252x^6$$

Coefficient of x^6 is 252

$$5) \text{Term in } x^2 = {}^{30}C_2 \times (2x)^2 \times (-1)^{28} = \frac{30 \times 29}{1 \times 2} \times 4x^2 \times 1 = 1740x^2$$

Coefficient of x^2 is 1740.

$$\text{Term in } x^3 = {}^{30}C_3 \times (2x)^3 \times (-1)^{27} = \frac{30 \times 29 \times 28}{1 \times 2 \times 3} \times 8x^3 \times -1 = -32480x^3$$

Coefficient of x^3 is -32480.

$$6) (1-2x)^{12} = 1 + 12 \times -2x + \frac{12 \times 11}{1 \times 2} (-2x)^2 + \dots$$

$$= 1 - 24x + 66 \times 4x^2 + \dots$$

$$= 1 - 24x + 264x^2 + \dots$$

$$\text{Putting } x = 0.01: (1 - 0.02)^{12} = 1 - 24 \times 0.01 + 264 \times 0.01^2 + \dots$$

$$0.98^{12} = 1 - 0.24 + 0.0264 + \dots = 0.7864$$