



1. Find the first 3 terms, in ascending powers of  $x$ , of the binomial expansion of  $(3 - 2x)^5$ , giving each term in its simplest form. (4)
2. Find and simplify the binomial expansion of  $(3x - 2)^4$ . [4]
3. The first four terms in the binomial expansion of  $\left(1 + \frac{x}{3}\right)^6$  are  $1 + ax + bx^2 + cx^3$ . Find the values of the constants  $a$ ,  $b$  and  $c$ , giving your answers in their simplest form. (4 marks)
4. (a) Using the binomial expansion, or otherwise, express  $(1 - x)^3$  in ascending powers of  $x$ . (2 marks)  
(b) Show that the expansion of
$$(1 + y)^4 - (1 - y)^3$$
is
$$7y + py^2 + qy^3 + y^4$$
where  $p$  and  $q$  are constants to be found. (4 marks)
5. Find the coefficient of  $x^4$  in the binomial expansion of  $(5 + 2x)^6$ . [4]
6. (i) Find the binomial expansion of  $(3 + 2x)^5$ , simplifying the terms. [4]  
(ii) Hence find the binomial expansion of  $(3 + 2x)^5 + (3 - 2x)^5$ . [2]

7. (i) Evaluate  ${}^5C_3$ . [1]
- (ii) Find the coefficient of  $x^3$  in the expansion of  $(3 - 2x)^5$ . [4]
8. (a) Find the first 4 terms, in ascending powers of  $x$ , of the binomial expansion of  $(1 + ax)^{10}$ , where  $a$  is a non-zero constant. Give each term in its simplest form. (4)
- Given that, in this expansion, the coefficient of  $x^3$  is double the coefficient of  $x^2$ ,
- (b) find the value of  $a$ . (2)
9. (a) Find the first 3 terms, in ascending powers of  $x$ , of the binomial expansion of  $(3 + bx)^5$  where  $b$  is a non-zero constant. Give each term in its simplest form. (4)
- Given that, in this expansion, the coefficient of  $x^2$  is twice the coefficient of  $x$ ,
- (b) find the value of  $b$ . (2)
10. (i) Using the binomial expansion, or otherwise, express  $(2 + y)^3$  in the form  $a + by + cy^2 + y^3$ , where  $a$ ,  $b$  and  $c$  are integers. (2 marks)
- (ii) Hence show that  $(2 + x^{-2})^3 + (2 - x^{-2})^3$  can be expressed in the form  $p + qx^{-4}$ , where  $p$  and  $q$  are integers. (3 marks)
11. One of the terms in the binomial expansion of  $(4 + ax)^6$  is  $160x^3$ .
- (i) Find the value of  $a$ . [4]
- (ii) Using this value of  $a$ , find the first two terms in the expansion of  $(4 + ax)^6$  in ascending powers of  $x$ . [2]

12.

- a) Find the first 3 terms, in ascending powers of  $x$ , of the binomial expansion of

$$(2 - 3x)^6$$

giving each term in its simplest form.

(4)

- b) Hence, or otherwise, find the first 3 terms, in ascending powers of  $x$ , of the expansion of

$$\left(1 + \frac{x}{2}\right)(2 - 3x)^6$$

(3)

13.

- (a) Expand  $\left(1 + \frac{4}{x}\right)^2$ . (1 mark)

- (b) The first four terms of the binomial expansion of  $\left(1 + \frac{x}{4}\right)^8$  in ascending powers of  $x$  are  $1 + ax + bx^2 + cx^3$ . Find the values of the constants  $a$ ,  $b$  and  $c$ . (4 marks)

- (c) Hence find the coefficient of  $x$  in the expansion of  $\left(1 + \frac{4}{x}\right)^2 \left(1 + \frac{x}{4}\right)^8$ . (4 marks)

14. (i) Find and simplify the first three terms in the expansion of  $(2 + 5x)^9$  in ascending powers of  $x$ . [4]

- (ii) In the expansion of  $(3 + cx)^2(2 + 5x)^6$ , the coefficient of  $x$  is 4416. Find the value of  $c$ . [3]

15. (i) Find and simplify the first three terms in the expansion of  $(2 + 5x)^9$  in ascending powers of  $x$ . [4]

- (ii) In the expansion of  $(3 + cx)^2(2 + 5x)^6$ , the coefficient of  $x$  is 4416. Find the value of  $c$ . [3]

16.

- The binomial expansion of  $\left(2x + \frac{5}{x}\right)^6$  has a term which is a constant. Find this term. [4]

17. The first four terms in the binomial expansion of  $(3 + kx)^5$ , in ascending powers of  $x$ , can be written as  $a + bx + cx^2 + dx^3$ .
- (i) State the value of  $a$ . [1]
  - (ii) Given that  $b = c$ , find the value of  $k$ . [5]
  - (iii) Hence find the value of  $d$ . [2]
18. Each time Ben attempts to complete a crossword in his daily newspaper, the probability that he succeeds is  $\frac{2}{3}$ . The random variable  $X$  denotes the number of times that Ben succeeds in 9 attempts.
- (i) Find
    - (a)  $P(X = 6)$ , [3]