

HILLEL ACADEMY HIGH  
MATHEMATICS DEPARTMENT  
BINOMIAL EXPANSION

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

Complete the following showing all work!

Remember always to simplify the coefficients – they should be given as single number.

1. Find the first four terms in the expansion in ascending powers of  $x$  of the following  
(a)  $(1+x)^{13}$                       (b)  $(1-x)^{15}$                       (c)  $(1+3x)^{10}$                       (d)  $(2-5x)^7$
2. Find the coefficient of  $x^5$  in the expansion of each of the following  
(a)  $(2+x)^7$                       (b)  $(3-x)^8$                       (c)  $(a-3x)^9$                       (d)  $(\frac{3}{2}+2x)^9$
3. The coefficient of  $x^3$  in the expansion of  $(1+px)^5$  is 80. Find  $p$ .
4. In the expansion of  $(1-ax)^{13}$ , where  $a$  is a positive constant, the coefficient of  $x^2$  is 702.  
(i) Find the value of  $a$ .  
(ii) Evaluate the coefficient of  $x^3$ .
5. If the ratio of the coefficients of  $x^6$  and  $x^7$  in the expansion of  $(2+ax)^{11}$  is 14 : 25 find the value of  $a$ .
6. Given that the expansion of  $(1+ax)^n$  begins  $1+36x+576x^2$ , find the values of  $a$  and  $n$ .
7. Find the coefficient of  $a^3b^5$  in the expansion of  
(i)  $(3a-2b)^8$                       (ii)  $(5a+\frac{1}{2}b)^8$
8. Find the coefficient of  $x^2$  in the expansion of  $\left(x^4 + \frac{4}{x}\right)^3$
9. Find the term independent of  $x$  in the expansion of (i)  $\left(2x + \frac{5}{x}\right)^6$  (ii)  $\left(x + \frac{1}{2x}\right)^8$ .
10. In the expansion of  $(1-2x)^{11}$  the coefficient of  $x^3$  is  $k$  times the coefficient of  $x^2$ .  
Evaluate  $k$ .

Find the coefficient of  $a^4b^4$  in the expansion of  $\left(a + \frac{b}{2}\right)^8$ .

Evaluate the coefficient of  $x^5$  in the expansion of  $\left(x^2 - \frac{2}{x}\right)^7$ .

13. Find the coefficient of  $x^5$  in the expansion of  $(1-x)(1+2x)^8$
14. Find the term in  $x^6$  in the expansion of  $(1+2x)(2+3x)^6$
15. Evaluate the coefficient of  $x^9$  in the expansion of  $(1+2x)(3+x)^{11}$