

EXERCISE BH

THE BINOMIAL THEOREM

1. The pattern below is called Pascal's triangle and gives the co-efficients of the expansions of $(1+x)^n$. Write the next 5 rows in the pattern.

$n = 0$	$(1+x)^0$						
		1					
$n = 1$	$(1+x)^1$		1	1			
$n = 2$	$(1+x)^2$		1	2	1		
$n = 3$	$(1+x)^3$		1	3	3	1	
.....				

2. Using the Pascal triangle co-efficients, give the expansions of the following :

(a) $(1+x)^5$ (b) $(1-2x)^5$ (c) $\left(1-\frac{2}{a}\right)^7$

The expansion of $(a+b)^n$ may be written as

$$(a+b)^n = \sum_{r=0}^n {}^n C_r a^{n-r} b^r .$$

3. Write down the expansion of :

(a) $(a+b)^8$ (b) $\left(1+\frac{x}{2}\right)^4$ (c) $(2x-y)^5$

The $(r+1)$ th term in the expansion of $(a+b)^n$ is

$$T_{r+1} = {}^n C_r a^{n-r} b^r$$

4. Find the 4th term in the expansion of $(2a-3b)^7$
5. Find the 3rd term in the expansion of $\left(3x+\frac{2}{x^2}\right)^9$
6. Find the term independent of x (the constant term) in the expansion of
- (a) $\left(x+\frac{2}{x}\right)^6$ (b) $\left(x^3+\frac{2}{x}\right)^8$
7. What is the coefficient of x^4 in the expansion of
- (a) $\left(x+\frac{3}{x}\right)^8$ (b) $\left(\frac{2}{x}-x^2\right)^5$

8. In the expansion of $(b+2x)^6$, the co-efficients of x and x^2 are equal. Find the value of b if $b \neq 0$.
9. For what value of k will the co-efficients of x^3 and x^4 in the expansion of $(1+kx)^8$ be in the ratio 2:3.

ANSWERS

1. $n=4, (1+x)^4, 1\ 4\ 6\ 4\ 1$
 $n=5, (1+x)^5, 1\ 5\ 10\ 10\ 5\ 1$
 $n=6, (1+x)^6, 1\ 6\ 15\ 20\ 15\ 6\ 1$
 $n=7, (1+x)^7, 1\ 7\ 21\ 35\ 35\ 21\ 7\ 1$
 $n=8, (1+x)^8, 1\ 8\ 28\ 56\ 70\ 56\ 28\ 8\ 1$
2. (a) $1+5x+10x^2+10x^3+5x^4+x^5$,
 (b) $1-10x+40x^2-80x^3+80x^4-32x^5$,
 (c) $1-\frac{14}{a}+\frac{84}{a^2}-\frac{280}{a^3}+\frac{560}{a^4}-\frac{672}{a^5}+\frac{448}{a^6}-\frac{128}{a^7}$.
3. (a) $a^8+8a^7b+28a^6b^2+56a^5b^3+70a^4b^4+56a^3b^5+28a^2b^6+8ab^7+b^8$
 (b) $1+2x+\frac{3}{2}x^2+\frac{x^3}{2}+\frac{x^4}{16}$.
 (c) $32x^5-80x^4y+80x^3y^2-40x^2y^3+10xy^4-y^5$.
4. $-15\ 120a^4b^3$
5. $314\ 928x^3$
6. (a) $T_4 = 160$ (b) $T_7 = 1\ 792$
7. (a) 252 (b) -40
8. $b = 5$
9. $k = \frac{6}{5}$