

1. Solve for  $n$  ( $n$  a positive integer) :-

$$(a) \binom{n}{2} = 21 \qquad (b) \binom{n}{n-2} = 45$$

(c) Simplify  $\binom{n^2}{n^2-1}$  as far as possible.

(d) Prove that  $\binom{n+1}{r} = \binom{n}{r-1} + \binom{n}{r}$

2. Expand fully :- (a)  $(p+q)^5$  (b)  $\left(x - \frac{1}{x}\right)^4$

(c) What is the coefficient of the term containing  $x^5$  in the expansion of  $(1-2x)^7$ ?

(d) Expand  $\left(1 - \frac{3}{2}x - x^2\right)^5$  in ascending powers of  $x$ , as far as  $x^4$ .

3. Use binomial expansion to find the values of :-

(a)  $(1.1)^5$  (b)  $(0.98)^4$  correct to 3 significant figures.

4. Write down and simplify the term independent of  $x$  in the expansion of :-

$$\left(3x^2 - \frac{1}{2x}\right)^9.$$

5. Express each of the following in partial fractions :-

(a)  $\frac{5x+5}{x^2+3x-4}$

(b)  $\frac{x^3}{x^2-3x+2}$

(c)  $\frac{3x+1}{(x-1)(x^2-1)}$

(d)  $\frac{3x+3}{(x-1)(x^2+x+1)}$