

## 4A (1+x)<sup>n</sup>

How do we Calculate nCr?

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{1 \times 2} x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{1 \times 2 \times \dots \times r} x^r + \dots \quad (|x| < 1, n \in \mathbb{R})$$

1. Find:  $(1+x)^4$  **without** using the nCr button on your calculator

2. Find:  $(1-2x)^3$  **without** using the nCr button on your calculator

When does this formula come unstuck?

1. Find  $\frac{1}{(1+x)}$  up to the  $x^3$  term

- Find the Binomial expansion of:  $(1 - x)^{\frac{1}{3}}$  up to the  $x^3$  term and state the values of  $x$  for which it is valid...

3. Find the Binomial expansion of:  $\frac{1}{(1+4x)^2}$  up to the  $x^3$  term and state the values of  $x$  for which it is valid...

4. Find the Binomial expansion of:  $\sqrt{1 - 2x}$  up to the  $x^3$  term and by using  $x = 0.01$ , find an estimate for  $\sqrt{2}$

5.

$$f(x) = \frac{2 + x}{\sqrt{1 + 5x}}$$

a) Find the  $x^2$  term in the series expansion of  $f(x)$

b) State the range of values of  $x$  for which the expansion is valid

6. In the expansion of  $(1 + kx)^{-4}$  the coefficient of  $x^2$  is 90, and  $k > 0$

a) Find the value of  $k$

b) Find the corresponding coefficient of the  $x^3$  term