These notes are downloaded from Project Maths
[http://www.logitron.redtoe.co.uk/projectmaths]

C2 Key Points
Binomial Expansion

Using Pascal's triangle – Use when the power is a positive integer

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

Expand $(2 - x)^5$

$(2 - x)^5 = (2 + (-x))^5$

$$= 2^5 + \left[5\times 2^4(-x)^1\right] + \left[10\times 2^3(-x)^2\right] + \left[10\times 2^2(-x)^3\right] + \left[5\times 2(-x)^4\right] + (-x)^5$$

$$= 32 - 80x + 80x^2 - 40x^3 + 10x^4 - x^5$$

$$(a+b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$$

1) In each term, the sum of the powers = 5.

2) Use appropriate line in Pascal's Triangle.

3) **<u>Remember</u>** the bracket around (- x) e.g. $(2+(-x))^5$

4) Be careful with the signs.

5) Remember that $(2x)^3$ does **<u>NOT</u>** equal $2x^3$ - Do not forget the brackets. $(2x)^3 = 8x^3$.

<u>Notation</u>

$$\binom{n}{r} = {}^nC_r = \frac{n!}{r!(n-r)!}$$

Where $n! = n(n-1)(n-2)(n-3)\times\ldots\ldots\times 2\times 1$ and, by definition $0! = 1$

<u>Formula for binomial expansion</u>

$$(a+b)^n = \binom{n}{0}a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \ldots\ldots + \binom{n}{n}b^n$$

$$= a^n + na^{n-1}b + \frac{n(n-1)}{2!}a^{n-2}b^2 + \ldots\ldots + b^n$$

If we had, for example $(2x-4y)^3$, we would replace a with $2x$ and b with $(-4y)$ and also n with 3.