P(A ∪ B) = P(A) + P(B) – P(A ∩ B)

P(A | B) = $\frac{P(A ∩ B)}{P(B)}$

P(A ∩ B) = P(A) x P(B | A)

If mutually exclusive: P(A ∩ B) = 0

If independent: P(A ∩ B) = P(A) x P(B)

 P(A | B) = P(A)

 P(B | A) = P(B)

Without replacement → in nCr ways.

With replacement → in nr ways.

Binomial expansion: nCr x an-r x bn r = Term number n = Polynomial order

**Consider the expansion for ( x2 –** $\frac{2}{x}$ **)12 in descending powers of x.**

**[a] Find a mathematical expression for the coefficient of the term in** $\frac{1}{x^{12}}$**.**

nCr x (x2)n-r x (– $\frac{2}{x}$)r r = 12 because $\frac{1}{x^{12}}$ and n = 12 because the order is 12

12C12 x (x2)12-12 x (– $\frac{2}{x}$)12

1 x x 1 x (– $\frac{2}{x}$)12 = $\frac{4096}{x^{12}}$ = 4096 x $\frac{1}{x^{12}}$ → coefficient = 4096

**[b] Find a mathematical expression for the term independent of x.**

nCr x (x2)n-r x (– $\frac{2}{x}$)r r = 12 because $\frac{1}{x^{12}}$ and n = 12 because the order is 12

12Cr x (x2)12-r x ($-\frac{2}{x}$)r → x24-2r x ($-\frac{x}{2}$)r → 24 – 2r = r → 24 = 3r → r = 8

12C8 x (x2)4 x – ($\frac{2}{x}$)8 = 12C8 x (–2)8