Edexcel AS Mathematics The binomial expansion

Section 1: Finding binomial expansions

Crucial points

1. **When using the binomial expansion, make sure that you remember to raise the whole term to the appropriate power**
   e.g. in the expansion of $(1 + 2x)^n$, remember that $(2x)^r = 2^r x^r$.

✗ **Wrong:** $(2+3x)^3 = 2^3 + 3\times 2^2 \times 3x + 3\times 2\times 3x^2 + 3x^3$

$= 8 + 36x + 18x^2 + 3x^3$ ✗

✓ **Right:** $(2+3x)^3 = 2^3 + 3\times 2^2 \times (3x) + 3\times 2\times (3x)^2 + (3x)^3$

$= 8 + 36x + 54x^2 + 27x^3$ ✓

2. **Make sure that you can use the formula for binomial coefficients confidently**
   You need to know what is meant by ${}_nC_r$ - this could be tested in your examination, and you may need to show that you know this formula rather than just using Pascal's triangle.

3. **Make sure you can find specific binomial coefficients efficiently**
   If asked to find a particular term in a binomial expansion, don't do the full expansion (which would waste a lot of time), just find the coefficient you need, making sure you use the right binomial coefficient.
   Also, remember that ${}_nC_r = {}_nC_{n-r}$.

Example: Find the coefficient of x^5 in the expansion of $(3x+2)^7$.

Solution: The required binomial coefficient is ${}_7C_5$ or $\binom{7}{5}$.

${}_7C_5 = \frac{7\times 6}{2\times 1} = 21$, so the coefficient of x^5 is

$21\times (3)^5 \times 2^2 = 20412$ ✓

Be careful not to make an error like in 1 above! A very common incorrect answer would be:

$21\times (3)\times 2^2 = 252$ ✗