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A LEVEL MATHS

(42) Binomial Expansion (The $\binom{n}{r}$ Method)

WORKING AT D/E

(1) Use the binomial expansion to find the full expansion of $(2+3x)^4$ in ascending powers of x.

(2) Use the binomial expansion to show that the first 4 terms in the expansion of $\left(1+\frac{1}{4}x\right)^8$ are

$$1+2x+\frac{7}{4}x^2+\frac{7}{8}x^3$$

You must show full workings.

(3) Find the full expansion of $(1-x)^5$ simplifying each term.

WORKING AT B/C

(1) (a) Find the full expansion of $(a+b)^5$

(b) Hence, write down the expansion of $(a-b)^5$

(2) Find the full expansion of $\left(2+\frac{x}{2}\right)^4$ in ascending powers of x. Write each coefficient in their simplest form.

(3) Show that the term in x^7 in the expansion of $\left(5-\frac{x}{3}\right)^{11}$ is $-\frac{68750}{729}x^7$

WORKING AT A*/A

(1) Show that

$$\left(a+\frac{1}{a}\right)^4+\left(a-\frac{1}{a}\right)^4\equiv\frac{2}{a^4}(a^8+6a^4+1)$$

(2) (a) What is the maximum possible number of terms in the expansion of $(a+b)^n$ where n is a positive integer? Give your answer in terms of n.

(b) Write an expression for the seventh term in the expansion $(a+b)^n$ in terms of a, b and n.

(3) Alan claims that when n is an even positive integer in the expansion of $(x+x^{-1})^n$ there will always be a term independent of x. Is he correct? You must justify your answer.