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A LEVEL MATHS

(43) Binomial Expansion (Problem Solving)

WORKING AT D/E

(1) (a) Show that the expansion of $(1 + 2ax)^4$ can be written as
$$1 + 8ax + 24a^2x^2 + 32a^3x^3 + 16a^4x^4$$
(b) Given that the term in $x = 24$, find the value of a
(c) Hence, find the coefficient of the term in x^2

(2) (a) Show that the first 3 terms of the expansion of $(1 + x)^7$ are $1 + 7x + 21x^2$
(b) Hence, show that the first 3 terms in the expansion of $(1 - x)(1 + x)^7$ are $1 + 6x + 14x^2$

(3) In the expansion of $(2 + px)^6$ the coefficient of the term in x is 960.
Show, using the binomial expansion, that $p = 5$

WORKING AT B/C

(1) (a) Find the first 3 terms of the expansion $(p + 3x)^6$, where p is a positive constant. Give your answer in ascending powers of x fully simplifying each term.

(b) Given that the coefficient of the term in x is **twice** that of the term in x^2, show that
$$p^4(p - 15) = 0$$

(c) Hence, write down the value of p.

(d) Find the coefficient of the term in x.

(2) (a) Use the binomial expansion to find the full expansion of $(1 + x)^5$ in ascending powers of x.

(b) Using your answer to part (a), write down the first 3 terms in the expansion of $(1 - 2y)^5$

WORKING AT A*/A

(1) (a) Find the terms up to an including the term in x^3 in the expansion of $(3 + x)(1 + px)^7$ where p is a negative constant. Give each term in its simplest form.

(b) Given that the coefficient of the term in x^2 is 238, find the coeffieint of the term in x^3

(2) In the expansion of $(p - x)(1 + 2x)^8$ where p is a constant. The first 2 terms in ascending powers of x are $A + Bx^2$ where A and B are constants.

Find the values of A, B and p.

(3) In the expansion of $(p + x)(q + x^3)^n$ where n, p and q are positive constants, the highest power of x is x^{19}. How many terms are there in the expansion of $(p + x)(q + x^3)^n$?