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Year 2 (A-Level)

Binomial Expansion – Set 1

The marks shown are for guidance purposes only

When not specified, round all non-terminating decimals to 3 significant figures where applicable

Binomial Series

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

For $(n \in \mathbb{N})$ Where $\binom{n}{r} = {}^n C_r = \frac{n!}{r!(n-r)!}$

$$(1 + x)^n = 1 + nx + \frac{n(n-1)}{1 \times 2} x^2 + \dots + \frac{n(n-1) \dots (n-r+1)}{1 \times 2 \dots r} x^r + \dots$$

$(|x| < 1, n \in \mathbb{Q})$

This image shows a blank sheet of lined paper, likely intended for a student. It features a vertical margin line on the left side, creating a narrow column for writing. The rest of the page is filled with horizontal ruling lines, providing a guide for text alignment. The paper is otherwise empty, with no text or markings.

2 The coefficient of the third term in the expansion of the expression $(1 + 5x)^{\frac{1}{3}}$ is equal to the coefficient of the fourth term in the expansion of the expression $(1 + px)^5$. Find the value of p .

Give your answer to 3 significant figures **[5marks]**

A blank sheet of lined paper with a vertical margin line on the left side and horizontal ruling lines for writing.

3 Expand the expression $\frac{1}{1+2x}$ up to and including the term in x^4 and use your expansion to find an approximate value for $\frac{1}{1.0125}$ [4marks]

A series of 25 horizontal lines for writing, arranged in a grid with a vertical margin line on the left side.

Lined writing area with 28 horizontal lines.

5 Given that $f(x) = \frac{x-3}{x^2+5x-6}$

a) Express $f(x)$ as partial fractions **[4marks]**

b) Expand $f(x)$ up to and including the term in x^3

[6marks]

c) State the validity of the expansion **[2marks]**

d) Find the equation of a tangent to $f(x)$ at $x = -2$

Give your answer in the form $Ax + By + C = 0$

[6marks]

6 Given that $f(x) = \frac{x+1}{(x-2)(x+1)^2}$

a) Expression $f(x)$ as partial fractions [6marks]

b) If x is small so that x^4 and higher powers are ignored, express $f(x)$ in the form $Ax^3 + Bx^2 + Cx + D$
[6marks]

The image shows a large rectangular area, likely a page for a math worksheet. It features a vertical line on the left side, creating a margin. The rest of the page is filled with 28 horizontal lines, providing space for writing or calculations.

