Binomial Expansion (Year 13) - Edexcel Past Exam Questions

1. Use the binomial theorem to expand

$$\sqrt{(4 - 9x)}, \qquad |x| < \frac{4}{9},$$

in ascending powers of x, up to and including the term in x^3, simplifying each term. **(5)**

June 05 Q1

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2. $f(x) = \dfrac{3x^2 + 16}{(1-3x)(2+x)^2} = \dfrac{A}{(1-3x)} + \dfrac{B}{(2+x)} + \dfrac{C}{(2+x)^2}, \quad |x| < \frac{1}{3}.$

(a) Find the values of A and C and show that $B = 0$. **(4)**

(b) Hence, or otherwise, find the series expansion of $f(x)$, in ascending powers of x, up to and including the term in x^3. Simplify each term. **(7)**

Jan 06 Q5

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3. $f(x) = \dfrac{3x-1}{(1-2x)^2}, \quad |x| < \frac{1}{2}.$

Given that, for $x \neq \frac{1}{2}$, $\dfrac{3x-1}{(1-2x)^2} = \dfrac{A}{(1-2x)} + \dfrac{B}{(1-2x)^2}$, where A and B are constants,

(a) find the values of A and B. **(3)**

(b) Hence, or otherwise, find the series expansion of $f(x)$, in ascending powers of x, up to and including the term in x^3, simplifying each term. **(6)**

June 06 Q2

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4. $f(x) = (2 - 5x)^{-2}, \quad |x| < \frac{2}{5}.$

Find the binomial expansion of $f(x)$, in ascending powers of x, as far as the term in x^3, giving each coefficient as a simplified fraction. **(5)**

Jan 07 Q1

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5. $f(x) = (3 + 2x)^{-3}, \quad |x| < \frac{3}{2}$.

Find the binomial expansion of f(x), in ascending powers of x, as far as the term in x^3.

Give each coefficient as a simplified fraction. **(5)**

June 07 Q1

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6. (*a*) Use the binomial theorem to expand

$$(8-3x)^{\frac{1}{3}}, \qquad |x| < \frac{8}{3},$$

in ascending powers of x, up to and including the term in x^3, giving each term as a simplified fraction. **(5)**

(*b*) Use your expansion, with a suitable value of x, to obtain an approximation to $\sqrt[3]{(7.7)}$. Give your answer to 7 decimal places. **(2)**

Jan 08 Q2

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7. (*a*) Expand $\frac{1}{\sqrt{(4-3x)}}$, where $|x| < \frac{4}{3}$, in ascending powers of x up to and including the term in x^2. Simplify each term. **(5)**

(*b*) Hence, or otherwise, find the first 3 terms in the expansion of $\frac{x+8}{\sqrt{(4-3x)}}$ as a series in ascending powers of x. **(4)**

June 08 Q5

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8. $f(x) = \frac{27x^2 + 32x + 16}{(3x+2)^2(1-x)}, \quad |x| < \frac{2}{3}$.

Given that f(x) can be expressed in the form

$$f(x) = \frac{A}{(3x+2)} + \frac{B}{(3x+2)^2} + \frac{C}{(1-x)},$$

(*a*) find the values of B and C and show that $A = 0$. **(4)**

(*b*) Hence, or otherwise, find the series expansion of f(x), in ascending powers of x, up to and including the term in x^2. Simplify each term. **(6)**

(*c*) Find the percentage error made in using the series expansion in part (*b*) to estimate the value of f(0.2). Give your answer to 2 significant figures. **(4)**

Jan 09 Q3

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9. $f(x) = \dfrac{1}{\sqrt{(4+x)}}, \quad |x| < 4.$

Find the binomial expansion of f (x) in ascending powers of x, up to and including the term in x^3. Give each coefficient as a simplified fraction.

(6)

June 09 Q1

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10. (a) Find the binomial expansion of

$$\sqrt{(1-8x)}, \quad |x| < \frac{1}{8},$$

in ascending powers of x up to and including the term in x^3, simplifying each term. **(4)**

(b) Show that, when $x = \dfrac{1}{100}$, the exact value of $\sqrt{(1-8x)}$ is $\dfrac{\sqrt{23}}{5}$. **(2)**

(c) Substitute $x = \dfrac{1}{100}$ into the binomial expansion in part (a) and hence obtain an approximation to $\sqrt{23}$. Give your answer to 5 decimal places. **(3)**

Jan 10 Q1

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11. $\dfrac{2x^2+5x-10}{(x-1)(x+2)} \equiv A + \dfrac{B}{x-1} + \dfrac{C}{x+2}.$

(a) Find the values of the constants A, B and C. **(4)**

(b) Hence, or otherwise, expand $\dfrac{2x^2+5x-10}{(x-1)(x+2)}$ in ascending powers of x, as far as the term in x^2. Give each coefficient as a simplified fraction. **(7)**

June 10 Q5

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12. (*a*) Use the binomial theorem to expand

$$(2 - 3x)^{-2}, \quad |x| < \frac{2}{3},$$

in ascending powers of x, up to and including the term in x^3. Give each coefficient as a simplified fraction. **(5)**

$$f(x) = \frac{a + bx}{(2 - 3x)^2}, \quad |x| < \frac{2}{3}, \quad \text{where } a \text{ and } b \text{ are constants.}$$

In the binomial expansion of f(x), in ascending powers of x, the coefficient of x is 0 and the coefficient of x^2 is $\frac{9}{16}$.

Find

(*b*) the value of a and the value of b, **(5)**

(*c*) the coefficient of x^3 , giving your answer as a simplified fraction. **(3)**

Jan 11 Q5

13.
$$f(x) = \frac{1}{\sqrt{(9 + 4x^2)}}, \quad |x| < \frac{3}{2}.$$

Find the first three non-zero terms of the binomial expansion of f(x) in ascending powers of x. Give each coefficient as a simplified fraction. **(6)**

June 11 Q2
