Binomial Expansion 2 (Year 13) - Edexcel Past Exam Questions

1. (*a*) Expand

$$\frac{1}{(2-5x)^2}, \qquad |x| < \frac{2}{5},$$

in ascending powers of x, up to and including the term in x^2, giving each term as a simplified fraction. **(5)**

Given that the binomial expansion of $\frac{2+kx}{(2-5x)^2}$, $|x| < \frac{2}{5}$, is

$$\frac{1}{2} + \frac{7}{4}x + Ax^2 + \ldots,$$

(*b*) find the value of the constant k, **(2)**

(*c*) find the value of the constant A. **(2)**

Jan 12 Q3

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2. $$f(x) = \frac{6}{\sqrt{(9-4x)}}, \qquad |x| < \frac{9}{4}.$$

(*a*) Find the binomial expansion of f(x) in ascending powers of x, up to and including the term in x^3. Give each coefficient in its simplest form. **(6)**

Use your answer to part (*a*) to find the binomial expansion in ascending powers of x, up to and including the term in x^3, of

(*b*) $g(x) = \frac{6}{\sqrt{(9+4x)}}$, $|x| < \frac{9}{4}$, **(1)**

(*c*) $h(x) = \frac{6}{\sqrt{(9-8x)}}$, $|x| < \frac{9}{8}$. **(2)**

June 12 Q3

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3. Given

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

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.

(5)

Jan 13 Q1

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4. (a) Use the binomial expansion to show that

$$\sqrt{\left(\frac{1+x}{1-x}\right)} \approx 1 + x + \frac{1}{2}x^2, \qquad |x| < 1$$ **(6)**

(b) Substitute $x = \frac{1}{26}$ into

$$\sqrt{\left(\frac{1+x}{1-x}\right)} = 1 + x + \frac{1}{2}x^2$$

to obtain an approximation to $\sqrt{3}$.

Give your answer in the form $\frac{a}{b}$ where a and b are integers. **(3)**

June 13 Q2

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5. (a) Find the binomial expansion of

$$\sqrt[3]{(8-9x)}, \qquad |x| < \frac{8}{9}$$

in ascending powers of x, up to and including the term in x^3. Give each coefficient as a simplified fraction. **(6)**

(b) Use your expansion to estimate an approximate value for $\sqrt[3]{7100}$, giving your answer to 4 decimal places. State the value of x, which you use in your expansion, and show all your working. **(3)**

June 13(R) Q4

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6. Given that the binomial expansion of $(1 + kx)^{-4}$, $|kx| < 1$, is

$$1 - 6x + Ax^2 + \ldots$$

(a) find the value of the constant k, **(2)**

(b) find the value of the constant A, giving your answer in its simplest form. **(3)**

June 14 Q2

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7. (a) Find the binomial expansion of

$$\frac{1}{\sqrt{(9-10x)}}, \qquad |x| < \frac{9}{10}$$

in ascending powers of x up to and including the term in x^2.
Give each coefficient as a simplified fraction. **(5)**

(b) Hence, or otherwise, find the expansion of

$$\frac{3+x}{\sqrt{(9-10x)}}, \qquad |x| < \frac{9}{10}$$

in ascending powers of x, up to and including the term in x^2.
Give each coefficient as a simplified fraction. **(3)**

June 14(R) Q1

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8. (*a*) Find the binomial expansion of

$$(4+5x)^{\frac{1}{2}}, \quad |x| < \frac{4}{5},$$

in ascending powers of x, up to and including the term in x^2.
Give each coefficient in its simplest form. **(5)**

(*b*) Find the exact value of $(4+5x)^{\frac{1}{2}}$ when $x = \frac{1}{10}$.

Give your answer in the form $k\sqrt{2}$, where k is a constant to be determined. **(1)**

(*c*) Substitute $x = \frac{1}{10}$ into your binomial expansion from part (*a*) and hence find an approximate value for $\sqrt{2}$.

Give your answer in the form $\frac{p}{q}$, where p and q are integers. **(2)**

June 15 Q1

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9. Use the binomial series to find the expansion of

$$\frac{1}{(2+5x)^3}, \quad |x| < \frac{2}{5},$$

in ascending powers of x, up to and including the term in x^3.
Give each coefficient as a fraction in its simplest form. **(6)**

June 16 Q1

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10. $f(x) = (2 + kx)^{-3}, \quad |kx| < 2$, where k is a positive constant

The binomial expansion of $f(x)$, in ascending powers of x, up to and including the term in x^2 is

$$A + Bx + \frac{243}{16}x^2$$

where A and B are constants.

(*a*) Write down the value of A. **(1)**

(*b*) Find the value of k. **(3)**

(*c*) Find the value of B. **(2)**

June 17 Q2
