C4 Binomial Expansion Questions

Specimen

1. Write down and simplify the binomial expansion of $(1+2x)^{-\frac{1}{2}}$ up to and including the term in x^3.

Find the expansion of $\dfrac{(1-x)^2}{(1+2x)^{\frac{1}{2}}}$ in ascending powers of x up to and including the term in x^3. State the range of values of x for which the expansion is valid. [7]

2005 Summer

2. Expand $(1-2x)^{-\frac{1}{2}}$ in ascending powers of x up to and including the term in x^2. State the range of values of x for which the expansion is valid.

Hence, by writing $x = \dfrac{1}{8}$ in your expansion, find an approximate value for $\sqrt{3}$ in the form $\dfrac{a}{b}$, where a and b are integers. [5]

2006 Summer

10. Expand $\left(1+\dfrac{x}{8}\right)^{\frac{1}{2}}$ in ascending powers of x up to and including the term in x^2. State the range of x for which the expansion is valid. Hence by writing $x = 1$ in your expansion, show that $\sqrt{2} \approx \dfrac{256}{181}$. [5]

2007 Summer

4. Expand $(1+4x)^{\frac{1}{2}} - \dfrac{1}{1+3x}$ as far as the term in x^2. For what range of values of x is your expansion valid? [7]

2008 Summer

9. Expand $\frac{1+3x}{\sqrt{1-2x}}$ in ascending powers of x up to and including the term in x^2. State the range of x for which the expansion is valid. [5]

2009 Summer

9. Expand $(1+4x)^{\frac{1}{2}}$ in ascending powers of x as far as the term in x^2. State the range of values of x for which your expansion is valid.

Expand $(1+4k+16k^2)^{\frac{1}{2}}$ in ascending powers of k as far as the term in k^2. [6]

2010 Summer

5. Expand $\left(1-\frac{x}{4}\right)^{\frac{1}{2}}$ in ascending powers of x up to and including the term in x^2.

State the range of values of x for which your expansion is valid.

Hence, by writing $x = 1$ in your expansion, show that

$$\sqrt{3} \approx \frac{111}{64}.$$ [5]

2011 Summer

6. Expand $4(1+2x)^{\frac{1}{2}} - \frac{1}{(1+3x)^2}$ in ascending powers of x up to and including the term in x^2.

State the range of values of x for which your expansion is valid. [7]

2012 Summer

5. Expand $\left(1+\frac{x}{3}\right)^{\frac{1}{2}}$ in ascending powers of x up to and including the term in x^2.

State the range of values of x for which your expansion is valid.

Hence, by writing $x = \frac{1}{5}$ in your expansion, find an approximate value for $\sqrt{15}$ in the form $\frac{a}{b}$, where a and b are integers whose values are to be found. [5]

2013 Summer

5. *(a)* (i) Expand $(1 + 6x)^{\frac{1}{3}}$ in ascending powers of x up to and including the term in x^2.

(ii) State the range of values of x for which your expansion is valid. [3]

(b) Use your expansion in part *(a)* to find an approximate value for one root of the equation

$$2(1 + 6x)^{\frac{1}{3}} = 2x^2 - 15x.$$ [2]

2014 Summer

5. Expand

$$6\sqrt{1-2x} - \frac{1}{1+4x}$$

in ascending powers of x up to and including the term in x^2.
State the range of values of x for which your expansion is valid. [7]

2015

5. Expand $\left(1+\frac{x}{8}\right)^{-\frac{1}{2}}$ in ascending powers of x up to and including the term in x^2.

State the range of values of x for which your expansion is valid.
Hence, by writing $x = 1$ in your expansion, find an approximate value for $\sqrt{2}$ in the form $\frac{a}{b}$, where a and b are integers whose values are to be found. [5]

2016

2. *(a)* (i) Expand $\frac{1}{\sqrt{1+2x}}$ in ascending powers of x up to and including the term in x^2.

(ii) State the range of values of x for which your expansion is valid. [3]

(b) Use your expansion in part *(a)* to find an approximate value for one root of the equation

$$\frac{6}{\sqrt{1+2x}} = 4+15x-x^2.$$ [2]

2017

5. *(a)* Expand $(1+4x)^{-\frac{1}{2}}$ in ascending powers of x up to and including the term in x^2. State the range of values of x for which your expansion is valid. [3]

(b) Use your answer to part *(a)* to expand $(1+4y+8y^2)^{-\frac{1}{2}}$ in ascending powers of y up to and including the term in y^2. [3]

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