

Old Exam Questions – Old Course

Binomial Expansion

(C4 Summer 2005)

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

(C4 Summer 2006)

10. 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 x for which the expansion is valid. Hence by writing $x = 1$ in your expansion, show that $\sqrt{2} \approx \frac{256}{181}$. [5]

(C4 Summer 2007)

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

(C4 Summer 2008)

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]

(C4 Summer 2009)

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]

(C4 Summer 2010)

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

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

(C4 Summer 2011)

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]

(C4 Summer 2012)

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]

(C4 Summer 2013)

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

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

(C4 Summer 2014)

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]

(C4 Summer 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]

(C4 Summer 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
- $$\frac{6}{\sqrt{1+2x}} = 4 + 15x - x^2. \quad [2]$$

(C4 Summer 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]

(C4 Summer 2018)

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