

A-level
Topic : Binomial Theorem
May 2013-May 2025
Questions

Question 1

Expand $\frac{1+3x}{\sqrt{1+2x}}$ in ascending powers of x up to and including the term in x^2 , simplifying the coefficients. [4]

Question 2

Expand $(1+3x)^{\frac{1}{3}}$ in ascending powers of x , up to and including the term in x^3 , simplifying the coefficients. [4]

Question 3

Show that, for small values of x^2 ,

$$(1-2x^2)^{-2} - (1+6x^2)^{\frac{2}{3}} \approx kx^4,$$

where the value of the constant k is to be determined. [6]

Question 4

Given that $\sqrt[3]{1+9x} \approx 1+3x+ax^2+bx^3$ for small values of x , find the values of the coefficients a and b . [3]

Question 5

Expand $\frac{1}{\sqrt{1-2x}}$ in ascending powers of x , up to and including the term in x^3 , simplifying the coefficients. [4]

Question 6

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

Question 7

Expand $\frac{1}{\sqrt[3]{1+6x}}$ in ascending powers of x , up to and including the term in x^3 , simplifying the coefficients. [4]

Question 8

Expand $(3+2x)^{-3}$ in ascending powers of x up to and including the term in x^2 , simplifying the coefficients. [4]

Question 9

Expand $\sqrt[4]{(1 - 4x)}$ in ascending powers of x , up to and including the term in x^3 , simplifying the coefficients. [4]

Question 10

Expand $\frac{4}{\sqrt{(4 - 3x)}}$ in ascending powers of x , up to and including the term in x^2 , simplifying the coefficients. [4]

Question 11

Find the coefficient of x^3 in the expansion of $(3 - x)(1 + 3x)^{\frac{1}{3}}$ in ascending powers of x . [4]

Question 12

(a) Expand $(2 - 3x)^{-2}$ in ascending powers of x , up to and including the term in x^2 , simplifying the coefficients. [4]

(b) State the set of values of x for which the expansion is valid. [1]

Question 13

(a) Expand $\sqrt[3]{1 + 6x}$ in ascending powers of x , up to and including the term in x^3 , simplifying the coefficients. [4]

(b) State the set of values of x for which the expansion is valid. [1]

Question 14

Expand $(1 + 3x)^{\frac{2}{3}}$ in ascending powers of x , up to and including the term in x^3 , simplifying the coefficients. [4]

Question 15

When $(a + bx)\sqrt{1 + 4x}$, where a and b are constants, is expanded in ascending powers of x , the coefficients of x and x^2 are 3 and -6 respectively.

Find the values of a and b . [6]

Question 16

(a) Expand $(2 - x^2)^{-2}$ in ascending powers of x , up to and including the term in x^4 , simplifying the coefficients. [4]

(b) State the set of values of x for which the expansion is valid. [1]

Question 17

Expand $\sqrt{\frac{1+2x}{1-2x}}$ in ascending powers of x , up to and including the term in x^2 , simplifying the coefficients. [5]

Question 18

$$\text{Let } f(x) = \frac{2x^2 + 7x + 8}{(1+x)(2+x)^2}.$$

- (a) Express $f(x)$ in partial fractions. [5]
- (b) Hence obtain the expansion of $f(x)$ in ascending powers of x , up to and including the term in x^2 . [5]

Question 19

$$\text{Let } f(x) = \frac{21 - 8x - 2x^2}{(1+2x)(3-x)^2}.$$

- (a) Express $f(x)$ in partial fractions. [5]
- (b) Hence obtain the expansion of $f(x)$ in ascending powers of x , up to and including the term in x^2 . [5]

Question 20

Find the coefficient of x^3 in the binomial expansion of $(3+x)\sqrt{1+4x}$. [4]

Question 21

- (a) Find the coefficient of x^2 in the expansion of $(2x-5)\sqrt{4-x}$. [4]
- (b) State the set of values of x for which the expansion in part (a) is valid. [1]

Question 22

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

Question 23

Expand $(9-3x)^{\frac{1}{2}}$ in ascending powers of x , up to and including the term in x^2 , simplifying the coefficients. [4]

Question 24

- (a) Expand $(6-x)(1-2x)^{-\frac{3}{2}}$ in ascending powers of x , up to and including the term in x^2 , simplifying the coefficients. [4]
- (b) State the set of values of x for which the expansion is valid. [1]