A-level

Topic : Binomial Theorem

May 2013-May 2023

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 $\dfrac{4}{\sqrt{(4-3x)}}$ 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 $\sqrt{\dfrac{1+2x}{1-2x}}$ in ascending powers of x, up to and including the term in x^2, simplifying the coefficients. [5]

Question 18

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

(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

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

(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]