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PURE MATHEMATICS 2/P2

TOPIC- Sequences and series

Sub-topic: BINOMIAL EXPANSION

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10. The first 3 terms, in ascending powers of x, in the binomial expansion of $(1 + ax)^{20}$ are given by

$$1 + 4x + px^2$$

where a and p are constants.

(a) Find the value of a.

(2)

(b) Find the value of p.

(2)

One of the terms in the binomial expansion of $(1 + ax)^{20}$ is qx^4, where q is a constant.

(c) Find the value of q.

(2)

JA-17-I-12-10

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1. Find the first 4 terms, in ascending powers of x, of the binomial expansion of

$$\left(3 - \frac{1}{3}x\right)^5$$

giving each term in its simplest form.

(4)

JU-17

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5. (a) Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(2 - 9x)^4$$

giving each term in its simplest form.

(4)

$$f(x) = (1 + kx)(2 - 9x)^4, \text{ where } k \text{ is a constant}$$

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

$$A - 232x + Bx^2$$

where A and B are constants.

(b) Write down the value of A.

(1)

(c) Find the value of k.

(2)

(d) Hence find the value of B.

(2)

JU-16

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7. (a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of $(1 + kx)^8$, where k is a non-zero constant. Give each term in its simplest form.

Given that the coefficient of x^3 in this expansion is 1512

(b) find the value of k.

JA-16-IAL-12

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1. The first three terms in ascending powers of x in the binomial expansion of $(1 + px)^8$ are given by

$$1 + 12x + qx^2$$

where p and q are constants.

Find the value of p and the value of q.

(5)

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1. Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$\left(2-\frac{x}{4}\right)^{10}$$

giving each term in its simplest form.

(4)

JU-2015

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4. (a) Find the first 4 terms in ascending powers of x of the binomial expansion of

$$\left(2+\frac{x}{4}\right)^{10}$$

giving each term in its simplest form.

(4)

(b) Use your expansion to find an estimated value for 2.025^{10}, stating the value of x which you have used and showing your working.

(3)

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6. (a) Find the first 3 terms in ascending powers of x of the binomial expansion of

$$(2 + ax)^6$$

where a is a non-zero constant. Give each term in its simplest form.

(4)

Given that, in the expansion, the coefficient of x is equal to the coefficient of x^2

(b) find the value of a.

(2)

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4. (a) Find the first 4 terms in ascending powers of x of the binomial expansion of

$$\left(2+\frac{x}{4}\right)^{10}$$

giving each term in its simplest form.

(4)

(b) Use your expansion to find an estimated value for 2.025^{10}, stating the value of x which you have used and showing your working.

(3)

JA-15-I-12

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3. (a) Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(2 - 3x)^6$$

giving each term in its simplest form.

(4)

(b) Hence, or otherwise, find the first 3 terms, in ascending powers of x, of the expansion of

$$\left(1 + \frac{x}{2}\right)(2 - 3x)^6$$

(3)

JU-14

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1. The first three terms in ascending powers of x in the binomial expansion of $(1 + px)^{12}$ are given by

$$1 + 18x + qx^2$$

where p and q are constants.

Find the value of p and the value of q.

(5)

JA-14

THE BINOMIAL EXPANSION-05

1. Find the first 3 terms in ascending powers of x of

$$\left(2-\frac{x}{2}\right)^6$$

giving each term in its simplest form.

(4)

JA-14-I-12

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2. (a) Use the binomial theorem to find all the terms of the expansion of

$$(2 + 3x)^4$$

Give each term in its simplest form.

(4)

(b) Write down the expansion of

$$(2 - 3x)^4$$

in ascending powers of x, giving each term in its simplest form.

(1)

JU-2013

THE BINOMIAL EXPANSION-05

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1. Find the first 3 terms, in ascending powers of x, in the binomial expansion of

$$(2-5x)^6$$

Give each term in its simplest form.

(4)

JA-2013

THE BINOMIAL EXPANSION-05

1. Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(2 - 3x)^5$$

giving each term in its simplest form.

(4)

JU-12

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3. (a) Find the first 4 terms of the binomial expansion, in ascending powers of x, of

$$\left(1+\frac{x}{4}\right)^8$$

giving each term in its simplest form.

(4)

(b) Use your expansion to estimate the value of $(1.025)^8$, giving your answer to 4 decimal places.

(3)

JA-12

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2. (a) Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(3+bx)^5$$

where b is a non-zero constant. Give each term in its simplest form.

(4)

Given that, in this expansion, the coefficient of x^2 is twice the coefficient of x,

(b) find the value of b.

(2)

JU-11

5. Given that $\binom{40}{4} = \frac{40!}{4!b!}$,

(a) write down the value of b.

(1)

In the binomial expansion of $(1+x)^{40}$, the coefficients of x^4 and x^5 are p and q respectively.

(b) Find the value of $\frac{q}{p}$.

(3)

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4. (a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of $(1+ax)^7$, where a is a constant. Give each term in its simplest form.

(4)

Given that the coefficient of x^2 in this expansion is 525,

(b) find the possible values of a.

(2)

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1. Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(3 - x)^6$$

and simplify each term.

(4)

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2. (a) Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(2+kx)^7$$

where k is a constant. Give each term in its simplest form.

(4)

Given that the coefficient of x^2 is 6 times the coefficient of x,

(b) find the value of k.

(2)

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1. Find the first 3 terms, in ascending powers of x, of the binomial expansion of $(3-2x)^5$, giving each term in its simplest form.

(4)

JA-9

THE BINOMIAL EXPANSION-05

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3. (a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of $(1 + ax)^{10}$, where a is a non-zero constant. Give each term in its simplest form.

(4)

Given that, in this expansion, the coefficient of x^3 is double the coefficient of x^2,

(b) find the value of a.

(2)

JU-08

THE BINOMIAL EXPANSION-05

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3. (a) Find the first 4 terms of the expansion of $\left(1+\frac{x}{2}\right)^{10}$ in ascending powers of x, giving each term in its simplest form.

(4)

(b) Use your expansion to estimate the value of $(1.005)^{10}$, giving your answer to 5 decimal places.

(3)

JA-08

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3. (a) Find the first four terms, in ascending powers of x, in the binomial expansion of $(1+kx)^6$, where k is a non-zero constant.

(3)

Given that, in this expansion, the coefficients of x and x^2 are equal, find

(b) the value of k,

(2)

(c) the coefficient of x^3.

(1)

JU-7

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2. (a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of $(1-2x)^5$. Give each term in its simplest form.

(4)

(b) If x is small, so that x^2 and higher powers can be ignored, show that

$$(1+x)(1-2x)^5 \approx 1-9x\,.$$

(2)

JA-7

THE BINOMIAL EXPANSION-05

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1. Find the first 3 terms, in ascending powers of x, of the binomial expansion of $(2 + x)^6$, giving each term in its simplest form.

(4)

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2. (*a*) Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(1 + px)^9,$$

where p is a constant.

(2)

The first 3 terms are 1, $36x$ and qx^2, where q is a constant.

(*b*) Find the value of p and the value of q.

(4)

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4. (a) Write down the first three terms, in ascending powers of x, of the binomial expansion of $(1 + px)^{12}$, where p is a non-zero constant.

(2)

Given that, in the expansion of $(1 + px)^{12}$, the coefficient of x is $(-q)$ and the coefficient of x^2 is $11q$,

(b) find the value of p and the value of q.

(4)

JU-05