

Unit 6: Series

Subunit 6.1: Binomial expansion

Topical Question No: 1

- 6** The coefficient of $\frac{1}{x}$ in the expansion of $\left(2x + \frac{a}{x^2}\right)^5$ is 720.

(a) Find the possible values of the constant a .

[3]

[illegible]

- (b)** Hence find the coefficient of $\frac{1}{x^7}$ in the expansion.

[2]

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Topical Question No: 2

- 1 (a)** Find the first three terms in the expansion, in ascending powers of x , of $(1 + x)^5$. [1]

[illegible]

- (b)** Find the first three terms in the expansion, in ascending powers of x , of $(1 - 2x)^6$. [2]

[illegible]

- (c) Hence find the coefficient of x^2 in the expansion of $(1+x)^5(1-2x)^6$. [2]

[illegible]

Topical Question No: 3

3 Find the term independent of x in each of the following expansions.

$$\textbf{(a)} \quad \left(3x + \frac{2}{x^2}\right)^6 \quad [3]$$

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$$\textbf{(b)} \quad \left(3x + \frac{2}{x^2}\right)^6 (1 - x^3) \quad [3]$$

[illegible]

Topical Question No: 4

- 6** In the expansion of $\left(\frac{x}{a} + \frac{a}{x^2}\right)^7$, it is given that

$$\frac{\text{the coefficient of } x^4}{\text{the coefficient of } x} = 3.$$

Find the possible values of the constant a .

[6]

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Topical Question No: 5

- 6** It is given that the coefficient of x^3 in the expansion of

$$(2+ax)^4(5-ax)$$

is 432.

Find the value of the constant a .

[5]

[illegible]

3 (a) Find the complete expansion of $\left(2x - \frac{3}{x}\right)^4$. [4]

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(b) Hence determine the coefficient of x^2 in the expansion of $(x^2 + 5)\left(2x - \frac{3}{x}\right)^4$. [2]

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Topical Question No: 7

- 2** The coefficient of $\frac{1}{x}$ in the expansion of $\left(kx + \frac{1}{x}\right)^5 + \left(1 - \frac{2}{x}\right)^8$ is 74.

Find the value of the positive constant k .

[5]

[illegible]

Topical Question No: 8

- 1 (a)** Find the coefficient of x^2 in the expansion of $\left(x - \frac{2}{x}\right)^6$. [2]

[illegible]

- (b) Find the coefficient of x^2 in the expansion of $(2 + 3x^2)\left(x - \frac{2}{x}\right)^6$. [3]

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings present.

Topical Question No: 9

- 4 (a)** Expand $(1 + a)^5$ in ascending powers of a up to and including the term in a^3 . [1]

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- (b)** Hence expand $[1 + (x + x^2)]^5$ in ascending powers of x up to and including the term in x^3 , simplifying your answer. [3]

[illegible]

Topical Question No: 10

- 3 (a)** Find the first three terms in the expansion of $(3 - 2x)^5$ in ascending powers of x . [3]

[illegible]

- (b)** Hence find the coefficient of x^2 in the expansion of $(4+x)^2(3-2x)^5$. [3]

[illegible]

Topical Question No: 11

- 4 The coefficient of x in the expansion of $\left(4x + \frac{10}{x}\right)^3$ is p . The coefficient of $\frac{1}{x}$ in the expansion of $\left(2x + \frac{k}{x^2}\right)^5$ is q .

Given that $p = 6q$, find the possible values of k . [5]

[illegible]

Topical Question No: 12

- 7 (a) Write down the first four terms of the expansion, in ascending powers of x , of $(a - x)^6$. [2]

[illegible]

- (b) Given that the coefficient of x^2 in the expansion of $\left(1 + \frac{2}{ax}\right)(a-x)^6$ is -20 , find in exact form the possible values of the constant a . [5]

[illegible]

Topical Question No: 13

- 3** The coefficient of x^4 in the expansion of $\left(2x^2 + \frac{k^2}{x}\right)^5$ is a . The coefficient of x^2 in the expansion of $(2kx - 1)^4$ is b .

(a) Find a and b in terms of the constant k .

[3]

[illegible]

(b) Given that $a + b = 216$, find the possible values of k .

[3]

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Topical Question No: 14

- 1** The coefficient of x^4 in the expansion of $(3+x)^5$ is equal to the coefficient of x^2 in the expansion of $\left(2x + \frac{a}{x}\right)^6$.

Find the value of the positive constant a .

[4]

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Topical Question No: 15

2 (a) Find the first three terms in the expansion, in ascending powers of x , of $(2 + 3x)^4$. [2]

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(b) Find the first three terms in the expansion, in ascending powers of x , of $(1 - 2x)^5$. [2]

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(c) Hence find the coefficient of x^2 in the expansion of $(2 + 3x)^4(1 - 2x)^5$. [2]

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Topical Question No: 16

- 2 The coefficient of x^4 in the expansion of $(x+a)^6$ is p and the coefficient of x^2 in the expansion of $(ax+3)^4$ is q . It is given that $p+q=276$.

Find the possible values of the constant a .

[4]

[illegible]

Topical Question No: 17

- 3 (a)** Give the complete expansion of $\left(x + \frac{2}{x}\right)^5$. [2]

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.

- (b) In the expansion of $(a + bx^2)\left(x + \frac{2}{x}\right)^5$, the coefficient of x is zero and the coefficient of $\frac{1}{x}$ is 80.

Find the values of the constants a and b . [4]

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Topical Question No: 18

3 The coefficient of x^3 in the expansion of $(3+ax)^6$ is 160.

(a) Find the value of the constant a .

[2]

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(b) Hence find the coefficient of x^3 in the expansion of $(3+ax)^6(1-2x)$.

[3]

[illegible]

Topical Question No: 19

- 1** The coefficient of x^2 in the expansion of $(1-4x)^6$ is 12 times the coefficient of x^2 in the expansion of $(2+ax)^5$.

Find the value of the positive constant a .

[3]

[illegible]

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- (i) $(2 - px)^5$ [2]

[illegible]

- (ii) $\left(1 - \frac{1}{2}x\right)^4$ [2]

[illegible]

- (b) Given that the coefficient of x^2 in the expansion of $(2-px)^5\left(1-\frac{1}{2}x\right)^4$ is 93, find the possible values of the constant p . [3]

[illegible]