EQUITY
LEARNING PLACE

Additional Math Topical (Binomial)

Question 1:

i) Find the term independent of *x* in the binomial expansion of $\left(x-\frac{2}{x^2}\right)^9$.

ii) Hence, find the value of *k* given that there is no constant term in the expansion of

$(1+kx^6)\left(x-\frac{2}{x^2}\right)^9$.

Question 2:

i) Expand and simplify $\left(x-\frac{2}{x}\right)^4$ in descending powers of *x*.

ii) Given that the ratio of the coefficients of x^{-1} and x^2 in the expansion of $(1+kx)\left(x-\frac{2}{x}\right)^4$ is 12 : 1, find the value of *k*.

Question 3:

i) In the expansion of $\left(2x-\frac{1}{x^2}\right)^n$ in descending powers of *x*, the fifth term is independent of *x*. Show that the value of *n* is 12.

ii) Hence find the coefficient of $\frac{1}{x^6}$ in the expansion of $\left(2x-\frac{1}{x^2}\right)^n\left(3+x^3\right)$.

Question 4:

$\left(2x^2-\frac{1}{x}\right)^{13}$ is expanded in descending powers of *x*.

a) Find the coefficient of x^2.

b) Explain why in the above expansion, there is no term independent of *x*.

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Question 5:

a) Expand the first four terms of $(1-px)^6$ in ascending order.

b) Given that the coefficient of x^2 in the expansion of $(1-2x)^2(1-px)^6$ is 16, find the two possible values of the constant p

Question 6:

In the expansion of $(2+3x)^n$, the coefficient of x and x^2 are in the ratio of 1 : 9.
Find the value of n.

Question 7:

Find the first 4 terms in the expression of $(1+2x)^7$.

Hence, find the coefficient of x^2 in the expansion $(1-3x)^2(1+2x)^7$.

Question 8:

Find the general term for the expansion of $\left(x^2+\frac{2}{x^3}\right)^5$ and write down the power of x in this general term.

Hence, find the term independent of x in the expansion of $\left(x^2+\frac{2}{x^3}\right)^5$.

Question 9:

Given that the term independent of x in the binomial expansion of $\left(x^4+\frac{k}{x^2}\right)^9$ is $\frac{21}{16}$, find the value of the positive constant k.

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Question 10:

a) Write down the first three terms in the expansion of $(1-2x)^7$ in ascending powers of *x*.

b) The first three terms in the expansion of $(p+qx)(1-2x)^7$ are $3+rx+182x^2$. Find the value of *p*, of *q* and of *r*.

Question 11:

Write down, in ascending order, the first 3 terms in the expansion of

a) $(1-3x)^8$

b) $\left(1+\frac{x}{2}\right)^{10}$

Hence, find the coefficient of x^2 in the expansion of $(1-3x)^8\left(1+\frac{x}{2}\right)^{10}$.

Question 12:

Given that the term independent of *x* in the expansion of $\left(x^2-\frac{k}{x}\right)^9$, where *k* is a positive constant, is 61236, find the value of *k*.

Question 13:

a) Find the first four terms of the expansion $(2-3x)^6$, in ascending powers of *x*.

Hence, by substituting a suitable value of *x*, estimate the value of $(1.9955)^6$ to 5 decimal places.

b) The first three terms in the expansion of $(a+bx)(2-3x)^6$ are $192 + cx + 6192x^2$. Find the value of *a*, *b* and *c*.

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Question 14:

a) Find the term containing $\frac{1}{x^2}$ in the expansion of $\left(2x - \frac{1}{2x}\right)^{10}$.

b) In the expansion $\left(1+\frac{x}{k}\right)^n$, where k and n are integers and $n > 3$, the coefficient of x^3 is thrice the coefficient of x^2. Find n in terms of k.

Question 15:

a) In the expansion of $\left(4x+\frac{1}{x}\right)^8$, find the term independent of x.

b) In the expansion of $(3x+q)(x-p)^8$, the coefficient of x^8 is 245 and the coefficient of x^7 is 8800. Find the values of the integers p and q.

Question 16:

Expand $\left(1-\frac{x}{2}\right)^{10}$ in ascending powers of x up to the term in x^3.

If the coefficient of x^3 in the expansion $(5-px)\left(1-\frac{x}{2}\right)^{10}$ is -30, find the value of p.

Question 17:

In the expansion of $\left(x^2-\frac{2}{x}\right)^n$, the fifth term is independent of x. Find the value of n.

Question 18:

Expand $(1-3x)^5$ in ascending powers of x, up to and including the term in x^3.

Hence determine the coefficient of x^3 in the expansion of $(2+x)(1-3x)^5$.

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Question 19:

a) Write down, and simplify, the first three terms in the expansion of $(2-y)^7$ in ascending powers of *y*.

Using the expansion in part **(a)**,

b) estimate the value of 1.99^7, correct to three decimal places.

c) find the expansion $\left(2-\frac{x}{2}+x^2\right)^7$ in ascending powers of *x*, up to and including the term in x^2.

Question 20:

a) Simplify $\binom{n}{n-2}$.

b) State the general term in the expansion of $\left(x-\frac{1}{2x}\right)^{16}$.

Hence, or otherwise, find the independent term in the expansion of $\left(4+x^2\right)\left(x-\frac{1}{2x}\right)^{16}$.

Question 21:

a) Write down the first four terms in the expansion $\left(1-\frac{x}{2}\right)^{10}$ in ascending power of *x*.

b) In the expression $(mx+5)\left(1-\frac{x}{2}\right)^{10}$, the coefficient of x^3 is 60. Find the value of *m*.

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Question 22:

a) Write down and simplify the first three terms in the expansion of $\left(x-\frac{2}{x}\right)^6$ in descending powers of x.

b) Given that the coefficients of x^5 and x^4 in the expansion $\left(1+ax+bx^2\right)\left(x-\frac{2}{x}\right)^6$ are 24 and 18 respectively, find the value of a and of b.

c) Find the term independent of x in the expansion of $\left(x+\frac{3}{x^2}\right)^{15}$.

Question 23:

a) Write down and simplify the first four terms, in ascending powers of x, in the expansion of $(1+2x)^n$, where n is a positive integer.

b) Find the value of n for which the coefficient of x^3 is 20 times the coefficient of x in the expansion of $(1+2x)^n$. Hence, evaluate the coefficient of x^2.

Question 24:

a) Write down the first three terms in the expansion of $(x-p)^5$ in descending powers of x.

b) In the expansion of $(2x+q)(x-p)^5$, the coefficient of x^4 is –30 and there is no term in x^5. Given that p is a positive integer, find the values of the constants p and q.

Question 25:

Given that in the expansion of $(kx^2-1)^{10}$, where $k>0$, the coefficient of x^{12} is four times the coefficient of x^8, find the value of k.

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Question 26:

In the expansion of $\left(x^4-\frac{2}{x^2}\right)^9$, find the coefficient of $\frac{1}{x^{12}}$.

Question 27:

a) Write down and simplify the first three terms, in ascending powers of *x*, for the expansion of $(1-3x)^n$.

b) The expansion of $(1+3x)(1-3x)^n$, in ascending powers of *x* as far as the term in x^2, is $1-12x+ax^2$. Show that *n* = 5 and hence find the value of *a*.

Question 28:

In the expansion $\left(2x-\frac{1}{x^2}\right)^{12}$, find the coefficient of the term in $\frac{1}{x^{15}}$.

Question 29:

a) Find the coefficient of x^2 in the expansion of $\left(2x+\frac{1}{3x^3}\right)^{10}$.

b) Given that the first two terms in the expansion, in ascending powers of *x*, of $(1-2x)(1+x)^n$ are $a+bx^2$, find *n*, *a* and *b*.

Question 30:

a) Write down and simplify the first three terms of $(1-2x)^6$.

b) Use your expansion in part **(a)** to estimate the value of $(0.98)^6$.

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Question 31:

a) Expand $\left(2+\frac{1}{2}x\right)^4$ in ascending powers of x up to the term in x^2.

b) In the expansion of $\left(2+\frac{1}{2}x\right)^4\left(5-ax+2x^2\right)$, the coefficient of x^2 is 40. Find the value of a.

Question 32:

Find the term independent of x in the expansion of $\left(x^2+\frac{1}{x}\right)^{12}$.

Question 33:

Find the first three terms of the expansion, in ascending powers of x, of

a) $(1+2x)^7$,

b) $\left(1-\frac{1}{2}x\right)^7$.

Hence, obtain the coefficient of x^2 in the expansion of $\left(1+\frac{3}{2}x-x^2\right)^7$.