C1 Binomial Expansion

Specimen

7. *(a)* Using the binomial theorem, expand $(2x + 3)^4$, simplifying each term of the expansion. [4]

(b) In the binomial expansion of $(1 + 3x)^n$ the coefficient of x^2 is 54.

Given that $n > 0$, find the value of n. [4]

2005 Winter

10. *(a)* Write down the expansion of $(a + b)^4$. [2]

(b) In the binomial expansion of $(a + 2x)^4$, the coefficient of the term in x^2 is twelve times the coefficient of the term in x^3. Find the value of a. [3]

2005 Summer

4. Write down and simplify the first four terms in the binomial expansion of $(1 + 2x)^6$. [4]

2006 Winter

7. *(a)* Using the binomial theorem, expand $(3x + 2)^3$, simplifying each term of the expansion. [3]

(b) In the binomial expansion of $(1 + 2x)^n$ the coefficient of x^2 is twice the coefficient of x. Given that $n > 0$, find the value of n. [4]

2006 Summer

6. *(a)* Expand $(a + b)^4$. Hence expand $\left(3x - \frac{1}{3x}\right)^4$, simplifying each term of the expansion. [4]

(b) The coefficient of x^2 in the expansion of $(1 + 2x)^n$ is 40. Given that n is a positive integer, find the value of n. [2]

2007 Winter

4. *(a)* Expand $(a + b)^4$, simplifying your coefficients as much as possible. [2]

(b) Solve $(2 + x)^4 = 14 + 33x + 25x^2 + 8x^3 + x^4$. [4]

2007 Summer

5. *(a)* Expand $(a + b)^5$. Hence find the coefficient of x in the expansion of $\left(x + \frac{1}{2x}\right)^5$. [4]

(b) The coefficient of x^2 in the expansion of $(1 + x)^n$ is 36. Given that n is a positive integer, find the value of n. [3]

2008 Winter

4. *(a)* Expand $(a + b)^5$. [2]

(b) (i) Write down the first four terms in the expansion of $\left(1 + \frac{x}{2}\right)^5$ in ascending powers of x.

(ii) By substituting an appropriate value for x in (i), find an approximate value for $1{\cdot}05^5$. Show all your working and give your answer correct to three decimal places. [5]

2008 Summer

6. Use the binomial theorem to expand $(5 + 2x)^3$, simplifying each term of your expansion. [3]

2009 Winter

6. *(a)* Expand $(a + b)^5$. [2]

(b) Use your answer to part *(a)* to find the coefficient of x^3 in the expansion of $\left(\frac{1}{4} + 2x\right)^5$.

Simplify your answer. [2]

2009 Summer

7. *(a)* Expand $\left(x + \frac{2}{x}\right)^4$, simplifying each term of the expansion. [4]

(b) The coefficient of x^2 in the expansion of $(1 + x)^n$ is 55. Given that n is a positive integer, find the value of n. [3]

2010 Winter

7. In the binomial expansion of $(a + 3x)^5$, the coefficient of the term in x^2 is eight times the coefficient of the term in x. Find the value of the constant a. [4]

2010 Summer

4. *(a)* Write down the expansion of $(1 + x)^6$ in ascending powers of x up to and including the term in x^3. [2]

(b) By substituting an appropriate value for x in your expansion in *(a)*, find an approximate value for $0{\cdot}99^6$. **Show all your working** and give your answer correct to four decimal places. [3]

2011 Winter

5. **Use the binomial theorem** to express $\left(1+\sqrt{3}\right)^5$ in the form $a+b\sqrt{3}$, where a, b are integers whose values are to be found. [5]

2011 Summer

7. *(a)* Use the binomial theorem to expand $(3+2x)^4$, simplifying each term of the expansion. [4]

(b) In the binomial expansion of $\left(1+\frac{x}{4}\right)^n$, the coefficient of x^2 is five times the coefficient of x.
Given that n is a positive integer, find the value of n. [4]

2012 Winter

4. *(a)* Use the binomial theorem to expand $\left(x+\frac{3}{x}\right)^4$, simplifying each term of the expansion. [4]

(b) The coefficient of x^2 in the expansion of $(1+2x)^n$ is 760. Given that n is a positive integer, find the value of n. [3]

2012 Summer

4. Using the binomial theorem, write down and simplify the first four terms in the expansion of $(1-2x)^6$ in ascending powers of x. [4]

2013 Winter

7. In the binomial expansion of $(a+4x)^6$, where $a \neq 0$, the coefficient of the term in x^2 is twice the coefficient of the term in x. Find the value of a. [4]

2013 Summer

5. *(a)* Using the binomial theorem, write down and simplify the first three terms in the expansion of $(1 + 2x)^7$ in ascending powers of x. [3]

(b) Use your answer to part *(a)* to find the first three terms in the expansion of $(1 - 4x)(1 + 2x)^7$ in ascending powers of x. [3]

2014 Winter

5. *(a)* **Use the binomial theorem** to express $(1+\sqrt{6})^5$ in the form $a+b\sqrt{6}$, where a, b are integers whose values are to be found. [5]

(b) The coefficient of x^2 in the expansion of $(1+3x)^n$ is 495. Given that n is a positive integer, find the value of n. [3]

2014 Summer

4. *(a)* Write down the expansion of $(1 + x)^6$ in ascending powers of x up to and including the term in x^3. [2]

(b) **Showing all your working**, substitute an appropriate value for x in your expansion in part *(a)* to find an approximate value for $1{\cdot}1^6$. [3]

2015

6. *(a)* Using the binomial theorem, write down and simplify the first four terms in the expansion of $\left(1-\frac{x}{2}\right)^8$ in ascending powers of x. [4]

(b) The first two terms in the expansion of $(2 + ax)^n$ in ascending powers of x are 32 and $-240x$ respectively. Find the value of n and the value of a. [4]

2016

4. **Use the binomial theorem** to express $\left(\sqrt{3}-1\right)^5$ in the form $a+b\sqrt{3}$, where a, b are integers whose values are to be found. [5]

2017

5. *(a)* Use the binomial theorem to expand $\left(x+\frac{2}{x}\right)^4$, simplifying each term of the expansion. [4]

(b) In the binomial expansion of $(a + 2x)^6$, where $a \neq 0$, the coefficient of the term in x^2 is equal to the coefficient of the term in x. Find the value of a. [4]