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The Binomial Theorem

(Gaeaf 2005)

- 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]

(Haf 2005)

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

(Gaeaf 2006)

- 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]

(Haf 2006)

- 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]

(Gaeaf 2007)

- 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]

(Haf 2007)

- 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]

(Gaeaf 2008)

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 1.05^5 . Show all your working and give your answer correct to three decimal places. [5]

(Haf 2008)

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

(Gaeaf 2009)

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]

(Haf 2009)

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]

(Gaeaf 2010)

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]

(Haf 2010)

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 0.99^6 . **Show all your working** and give your answer correct to four decimal places. [3]

(Gaeaf 2011)

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

(Haf 2011)

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]

(Gaeaf 2012)

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]

(Haf 2012)

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]

(Gaeaf 2013)

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]

(Haf 2013)

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]

(Gaeaf 2014)

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]

(Haf 2014)

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]

(Haf 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]

(Haf 2016)

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

(Haf 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]

(Haf 2018)

5. (a) Using the binomial theorem, write down and simplify the first four terms in the expansion of $\left(1 - \frac{x}{2}\right)^7$ in ascending powers of x . [4]
- (b) The coefficient of x^2 in the expansion of $(1 + 4x)^n$ is 3360. Given that n is a positive integer, find the value of n . [3]

(Haf 2019)

4. Use the binomial theorem to express $(2 - \sqrt{3})^5$ in the form $a + b\sqrt{3}$, where a, b are integers whose values are to be found. [5]