

1. Write the simplified expansion of each of the following.
  - a)  $(x+2)^3$
  - b)  $(y-5)^4$
  - c)  $(4x+1)^5$
  - d)  $(2x-1)^5$
  - e)  $(2x+y)^4$
  - f)  $(x-7)^5$
2. Determine the value of the coefficient of  $x^5y^3$  in the expansion of  $(x+y)^8$ .
3. In the expansion of  $(x+y)^n$ , a term involving  $x^3y^4$  occurs.
  - a) Which term in the expansion is this?
  - b) What is the value  $n$ ?
  - c) What is the coefficient of  $x^3y^4$  in this expansion?
4. In the expansion of  $(x+y)^6$ , explain why the coefficient of  $x^4y^2$  is the same coefficient of  $x^2y^4$ .
5. a) How many terms are there in the expansions of  $(x+y)^{15}$  and  $(x+y)^{16}$ ?  
 b) Which expansion in part (a) has a middle term? Which has two middle terms?  
 c) When does the expansion of  $(x+y)^n$  have one middle term? When does it have two middle terms?
6. Write the simplified expansion of each of the following.
  - a)  $(x+2)^6$
  - b)  $(x-3)^4$
  - c)  $(2-x)^5$
  - d)  $(1+x^2)^6$
  - e)  $(x-2y)^4$
  - f)  $(2x+3y)^3$
  - g)  $\left(x+\frac{1}{x}\right)^5$
  - h)  $(3x+2y^2)^5$
7. Write the first four terms in each expansion. Simplify each term.
  - a)  $(\sqrt{x}+1)^{10}$
  - b)  $(x+2)^{12}$
  - c)  $(x-2)^8$
  - d)  $(1-2x)^{10}$

**Answers:**

- 1a)  $x^3 + 6x^2 + 12x + 8$       1b)  $y^4 - 20y^3 + 150y^2 - 500y + 625$   
 1c)  $1024x^5 + 1280x^4 + 640x^3 + 160x^2 + 20x + 1$       1d)  $32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$   
 1e)  $16x^4 + 32x^3y + 24x^2y^2 + 8xy^3 + y^4$       1f)  $x^5 - 35x^4 + 490x^3 - 3430x^2 + 12005x - 16807$   
 2a) 56      3a) 5<sup>th</sup> term      3b) 7      3c) 35  
 4) In an expansion with 7 terms, the 3<sup>rd</sup> term and the 5<sup>th</sup> term have the same value, 15  
 5a) 16, 17      5b)  $(x+y)^{16}$  has a middle term since it has 17 terms, but  $(x+y)^{15}$  has 2 middle terms  
 5c) a single middle term when n is even and 2 middle terms when n is odd  
 6a)  $x^6 + 12x^5 + 60x^4 + 160x^3 + 240x^2 + 192x + 64$       6b)  $x^4 - 12x^3 + 54x^2 - 108x + 81$   
 6c)  $-(x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32)$       6d)  $x^{12} + 6x^{10} + 15x^8 + 20x^6 + 15x^4 + 6x^2 + 1$   
 6e)  $x^4 - 8x^3y + 24x^2y^2 - 32xy^3 + 16y^4$       6f)  $8x^3 + 36x^2y + 54xy^2 + 27y^3$   
 6g) 
$$\frac{x^{10} + 5x^8 + 10x^6 + 10x^4 + 5x^2 + 1}{x^5}$$
 note final answer has a common denominator

- 6h)  $243x^5 + 810x^4y^2 + 1080x^3y^4 + 720x^2y^6 + 240xy^8 + 32y^{10}$   
 7a)  $x^5 + 10x^4\sqrt{x} + 45x^4 + 120x^3\sqrt{x} \dots$       7b)  $x^{12} + 24x^{11} + 264x^{10} + 1760x^9 + \dots$   
 7c)  $x^8 - 16x^7 + 112x^6 - 448x^5 \dots$       7d)  $1024x^{10} - 512x^9 + 256x^8 - 128x^7 \dots$