



b.  $(3x-2)^5$     1 5 10 10 5 1  $\leftarrow \binom{5}{0}, \binom{5}{1}, \binom{5}{2}, \text{ etc.}$

$$1(3x)^5(-2)^0 + (5)(3x)^4(-2)^1 + 10(3x)^3(-2)^2 + 10(3x)^2(-2)^3 + 5(3x)^1(-2)^4 + 1(3x)^0(-2)^5$$

$$\boxed{243x^5 - 810x^4 + 1080x^3 - 720x^2 + 240x - 32}$$

c.  $(x^2+3y)^3$     1 3 3 1

$$1(x^2)^3(3y)^0 + 3(x^2)^2(3y)^1 + 3(x^2)^1(3y)^2 + 1(x^2)^0(3y)^3$$

$$\boxed{x^6 + 9x^4y + 27x^2y^2 + 27y^3}$$

d.  $(\sqrt{x}-\sqrt{3})^6$     1 6 15 20 15 6 1

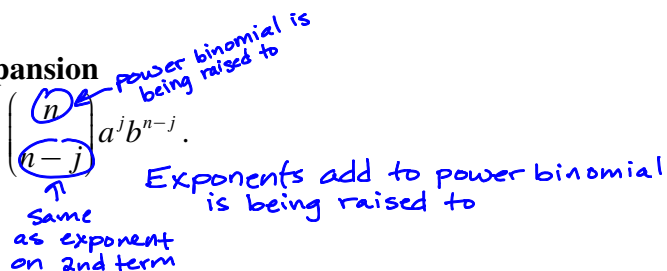
$$1(\sqrt{x})^6(-\sqrt{3})^0 + 6(\sqrt{x})^5(-\sqrt{3})^1 + 15(\sqrt{x})^4(-\sqrt{3})^2 + 20(\sqrt{x})^3(-\sqrt{3})^3 + 15(\sqrt{x})^2(-\sqrt{3})^4 + 6(\sqrt{x})^1(-\sqrt{3})^5 + 1(\sqrt{x})^0(-\sqrt{3})^6$$

$$6 \cdot x^2 \sqrt{x} \cdot -\sqrt{3} + 15 \cdot x^2 \cdot 3 + 20 \cdot x \sqrt{x} \cdot -3\sqrt{3} + 15 \cdot x \cdot 9 + 6 \cdot \sqrt{x} \cdot -9\sqrt{3}$$

$$\boxed{x^3 - 6x^2\sqrt{3x} + 45x^2 - 60x\sqrt{3x} + 135x - 54\sqrt{3x} + 27}$$

### Finding a Particular Coefficient or Term in a Binomial Expansion

Based on the expansion of  $(a+b)^n$ , the term containing  $a^j$  is



#### Examples:

a. Find the coefficient of  $x^5$  in the expansion of  $(x-1)^8$ .

$$\binom{8}{3} x^5 (-1)^3 = -56x^5 \quad \boxed{-56}$$

b. Find the coefficient of  $y^3$  in the expansion of  $(4y+2)^6$ .

$$\binom{6}{3} (4y)^3 (2)^3 = 10,240y^3 \quad \boxed{10,240}$$

c. Find the fifth term in the expansion of  $(2x-y)^9$ .

$$x^1 \quad x^2 \quad x^3 \quad x^4 \quad x^5$$

↑  
5<sup>th</sup> term

$$\binom{9}{4} (2x)^5 (-y)^4 = \boxed{4032x^5y^4}$$

d. Find the third term in the expansion of  $(\sqrt{x}+1)^7$ .

$$(\sqrt{x})^7 \quad (\sqrt{x})^6 \quad (\sqrt{x})^5$$

↑  
3<sup>rd</sup> term

$$\binom{7}{2} (\sqrt{x})^5 (1)^2 = \boxed{21x^2\sqrt{x}}$$