Finding a Particular Term

General form $\boxed{t_{k+1} = {}_nC_k(x)^{n-k}(y)^k}$

Determine the 9th term of $(x - 3)^{10}$ n

$t_9 = {}_{10}C_8 (x)^2 (-3)^8$

k+1
8+1

$= (45)(x^2)(6561)$

$= 295245x^2$

ex. Find the 6th term of $(3x - 2y)^8$ n

x y

$k=5$

$t_6 = {}_8C_5 (3x)^3(-2y)^5$

$= 56 (27x^3)(-32y^5)$

$= -48384x^3y^5$

ex. Find the 3rd term of $\left(3x^4 - \frac{1}{x^3}\right)^9$ n

x y

$k = 2$

$t_3 = {}_9C_2 (3x^4)^7 \left(-\frac{1}{x^3}\right)^2$

$= (36)(2187x^{28})\left(\frac{1}{x^6}\right)$

$= 78732x^{22}$

Finding a missing value

ex 1) Find the term that contains x^{12} of $(-x^3 + 2)^6$

option 1

$t_{k+1} = {}_nC_k (x)^{n-k} (y)^k$

$x^{12} = \cancel{{}_6C_k} (-x^3)^{6-k} \cancel{(2)^k}$

$x^{12} = (\cancel{-}x)^{18-3k}$

$12 = 18 - 3k$

$-6 = -3k$

$k = 2$

$\therefore$ term 3

$(x^3)^6, (x^3)^5, (x^3)^4, (x^3)^3, \ldots$

$x^{18}, x^{15}, x^{12}, x^9, \ldots$

The pattern decreasing by 3

$\therefore$ term 3

ex 2) Find the term that contains x^{-3} of $\left(x + \frac{1}{\cancel{3}x}\right)^{7}$ n

option 1:

$x^{-3} = (x)^{7-k}\left(\frac{1}{x}\right)^{k}$

$x^{-3} = (x)^{7-k}(x)^{-k}$

$-3 = 7 - 2k$

$-10 = -2k$

$k = 5$

$\therefore$ term 6

option 2:

$(x)^{7}\left(\frac{1}{x}\right)^{0}, (x)^{6}\left(\frac{1}{x}\right)^{1}, (x)^{5}\left(\frac{1}{x}\right)^{2}$

$x^{7}, x^{5}, x^{3}, x^{1}, x^{-1}, x^{-3}, \ldots$

The pattern decreasing by 2

$\therefore$ term 6

ex 3) Find the term containing x^2 in the expansion of $\left(x^3 - \frac{a}{x}\right)^{10}$

$x^{2} = (x^{3})^{10-k}\left(\frac{1}{x}\right)^{k}$

$x^{2} = x^{30-3k}x^{-k}$

$x^{2} = x^{30-4k}$

$2 = 30 - 4k$

$-28 = -4k$

$k = 7$

$\therefore$ term 8

$(x^{3})^{10}\left(\frac{1}{x}\right)^{0}, (x^{3})^{9}\left(\frac{1}{x}\right)^{1}, (x^{3})^{8}, \left(\frac{1}{x}\right)^{2}$

$x^{30}, x^{26}, x^{22}, x^{18}, x^{14}, \ldots$

The pattern is decreasing by 4

$\therefore$ term 8

p.742
#2,5,11
p.746 #9