In the following Examples we see how the general binomial expansion $(a+b)^n$ may be put to use.

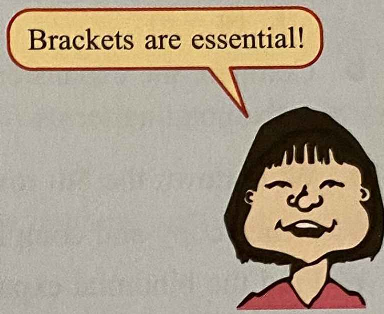
Example 2 **Self Tutor**

Use $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ to find the binomial expansion of:

a $(2x+3)^3$ **b** $(x-5)^3$

a In the expansion of $(a+b)^3$ we substitute $a = (2x)$ and $b = (3)$.

$$\therefore\ (2x+3)^3 = (2x)^3 + 3(2x)^2(3) + 3(2x)^1(3)^2 + (3)^3$$
$$= 8x^3 + 36x^2 + 54x + 27$$



b We substitute $a = (x)$ and $b = (-5)$

$$\therefore\ (x-5)^3 = (x)^3 + 3(x)^2(-5) + 3(x)(-5)^2 + (-5)^3$$
$$= x^3 - 15x^2 + 75x - 125$$

Example 3 **Self Tutor**

Find the:

a 5th row of Pascal's triangle **b** binomial expansion of $\left(x - \frac{2}{x}\right)^5$.

a

1 1 ← the 1st row, for $(a+b)^1$

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1 ← the 5th row, for $(a+b)^5$

b Using the coefficients obtained in **a**, $(a+b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$

Letting $a = (x)$ and $b = \left(\frac{-2}{x}\right)$,

$$\left(x - \frac{2}{x}\right)^5$$
$$= (x)^5 + 5(x)^4\left(\frac{-2}{x}\right) + 10(x)^3\left(\frac{-2}{x}\right)^2 + 10(x)^2\left(\frac{-2}{x}\right)^3 + 5(x)\left(\frac{-2}{x}\right)^4 + \left(\frac{-2}{x}\right)^5$$
$$= x^5 - 10x^3 + 40x - \frac{80}{x} + \frac{80}{x^3} - \frac{32}{x^5}$$