CBSE Class 10 Maths Notes Chapter 2 Polynomials

- "Polynomial" comes from the word 'Poly' (Meaning Many) and 'nomial' (in this case meaning Term)-so it means many terms.
- A polynomial is made up of terms that are only added, subtracted or multiplied.
- A quadratic polynomial in x with real coefficients is of the form $ax^2 + bx + c$, where a, b, c are real numbers with $a \neq 0$.
- Degree – The highest exponent of the variable in the polynomial is called the degree of polynomial. Example: $3x^3 + 4$, here degree = 3.
- Polynomials of degrees 1, 2 and 3 are called linear, quadratic and cubic polynomial respectively.
- A polynomial can have terms which have Constants like 3, -20, etc., Variables like x and y and Exponents like 2 in y^2.
- These can be combined using addition, subtraction and multiplication but NOT DIVISION.
- The zeroes of a polynomial p(x) are precisely the x-coordinates of the points, where the graph of y = p(x) intersects the x-axis.

If α and β are the zeroes of the quadratic polynomial $ax^2 + bx + c$, then

$$sum \quad of \quad zeros, \alpha + \beta = \frac{-b}{a} = \frac{-coefficient \quad of \quad x}{coefficient \quad of \quad x^2}$$
$$product \quad of \quad zeros, \alpha\beta = \frac{c}{a} = \frac{constant \quad term}{coefficient \quad of \quad x^2}$$

If α, β, γ are the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d = 0$, then

$$\alpha + \beta + \gamma = \frac{-b}{a} = \frac{-coefficient \quad of \quad x^2}{coefficient \quad of \quad x^3}$$
$$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a} = \frac{coefficient \quad of \quad x}{coefficient \quad of \quad x^3}$$
$$\alpha\beta\gamma = \frac{-d}{a} = \frac{-constant \quad term}{coefficient \quad of \quad x^3}$$

Zeroes (α, β, γ) follow the rules of algebraic identities, i.e.,
$(\alpha + \beta)^2 = \alpha^2 + \beta^2 + 2\alpha\beta$
$\therefore(\alpha^2 + \beta^2) = (\alpha + \beta)^2 - 2\alpha\beta$

DIVISION ALGORITHM:
If p(x) and g(x) are any two polynomials with $g(x) \neq 0$, then
$p(x) = g(x) \times q(x) + r(x)$
Dividend = Divisor x Quotient + Remainder

Remember this!

- If r (x) = 0, then g (x) is a factor of p (x).
- If r (x) ≠ 0, then we can subtract r (x) from p (x) and then the new polynomial formed is a factor of g(x) and q(x).