# Factorisation by Factor Theorem and Remainder Theorem

**Important Concepts**

1. The method of finding the remainder without actually performing the process of division is called Remainder Theorem.

2. Remainder Theorem states that if p(x) is any polynomial of degree > 1, and a is any number then if p(x) is divided by (x – a) then the remainder is p(a).

3. When a polynomial p(x) is divided by (x+a), the remainder is the same as p(-a).

4. If a polynomial p(x) over R is divided by ax + b (a ≠ 0 and a, b ∈ R) then the remainder is $p\left(-\frac{b}{a}\right)$.

5. Factor Theorem states that if p(x) is a polynomial of degrees > 0 then it follows from the remainder theorem that
   a. p(x) = (x – a) q(x) + p(a) Where q(x) is a polynomial of degree n – 1.
   b. If p(a) = 0 then p(x) = (x – a) q(x).
   c. Thus, if p(a) = 0, then (x – a) is a factor of p(x).
6. ax + b (a ≠ 0, a, b ∈ R) is a factor of the polynomial p (x) over R if and only if $p\left(\frac{-b}{a}\right) = 0$.
7. (x-a)(x-b) is a factor of the polynomial p(x),iff p(a)=0 and p(b)=0.