Revision Notes

Class 10 – Maths

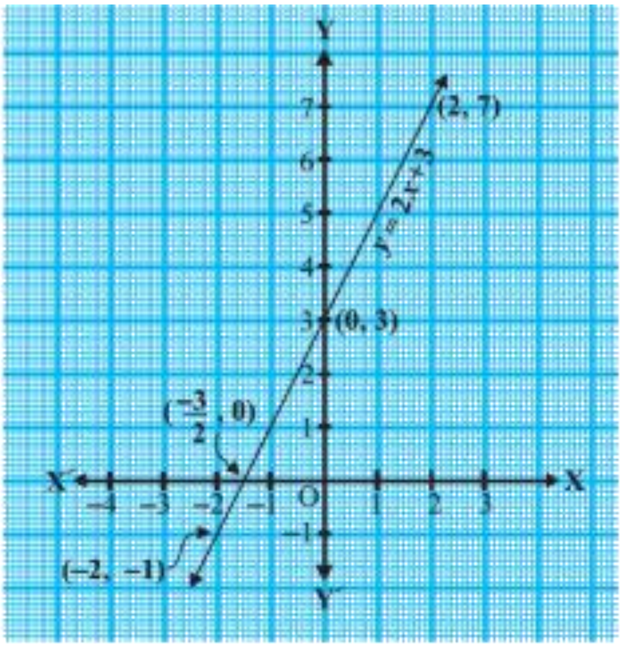
Chapter 2 – Polynomials

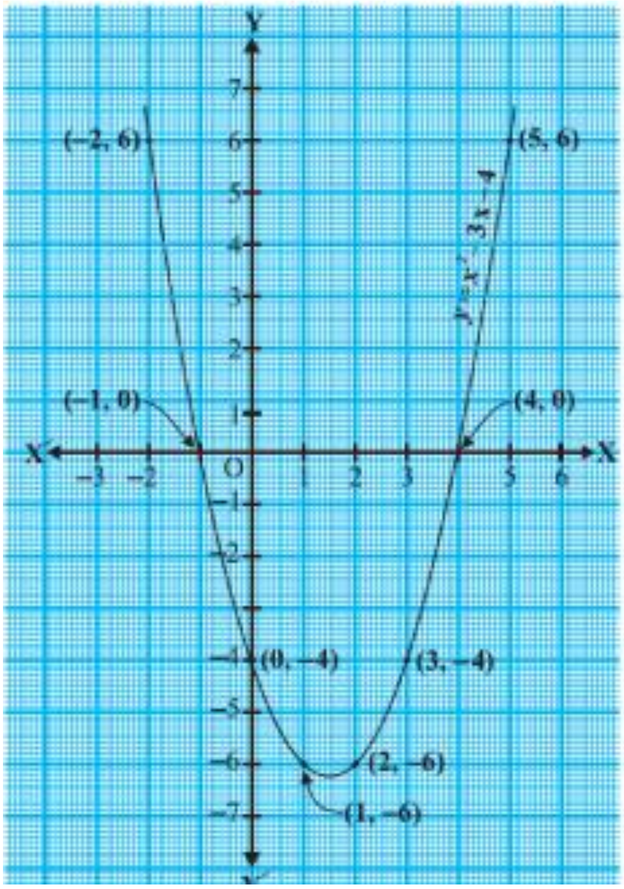
- If $p(x)$ is a polynomial in x, the degree of the polynomial $p(x)$ is the largest power of x in $p(x)$.

- **Types of Polynomials:**
  a) A linear polynomial is a polynomial with degree one.
  b) A quadratic polynomial is a polynomial with degree two.
  c) A cubic polynomial is a polynomial with degree three.

- **Zeros of a Polynomial:**
  If $p(x)$ is a polynomial in x and k is any real number, the value obtained by substituting k for x in $p(x)$ is known as the value of $p(x)$ when $x = k$ and is denoted by $p(k)$. If $p(k) = 0$, a real number k is said to be a zero of a polynomial $p(x)$.

- **The Geometrical Meaning of Polynomial Zeros:**

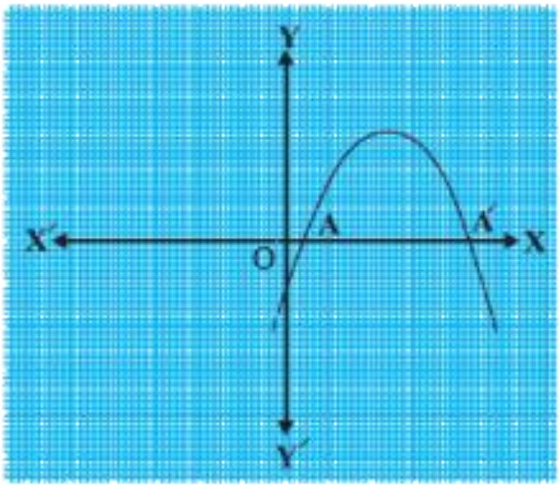




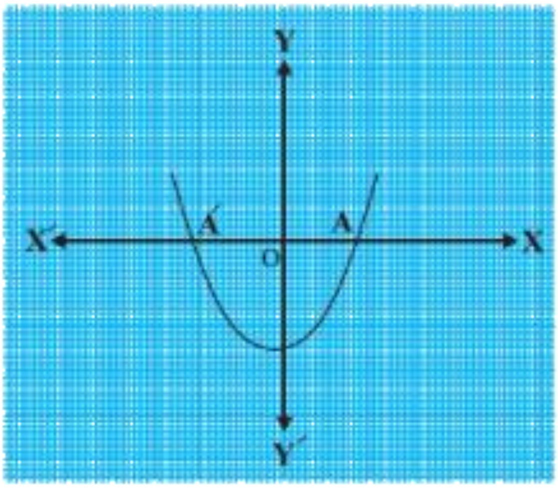
- The equation $ax^2 + bx + c$ can have three cases for the graphs

  a) Case (i):

  Here, the graph cuts x-axis at two distinct points A and A'.

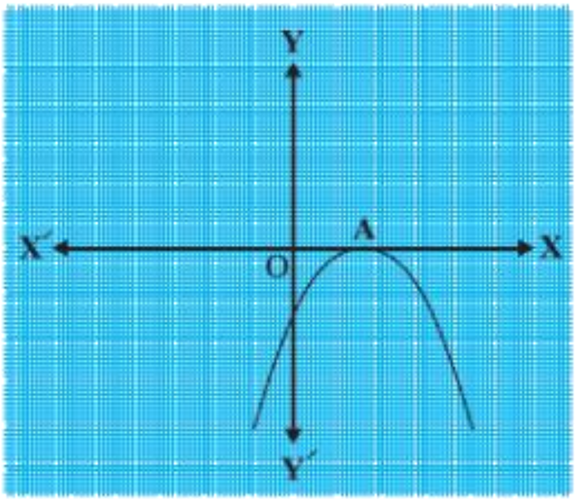


(i)

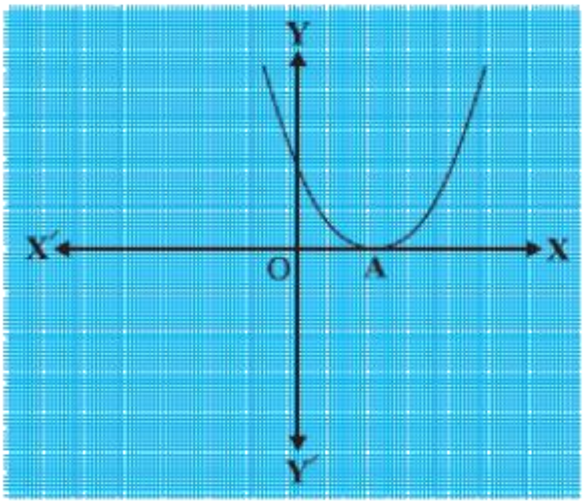


(ii)

  b) Case (ii): Here, the graph cuts the x-axis at exactly one point.

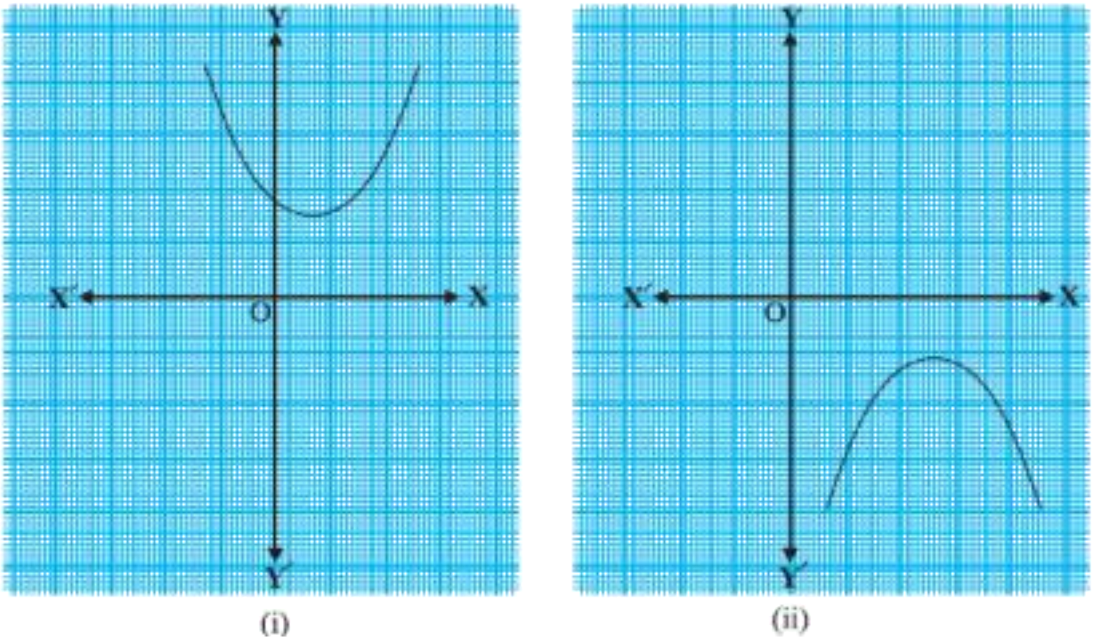


(i)



(ii)

c) Case (iii): Here, the graph is either completely above the x-axis or completely below the x-axis.



- If α and β are the zeroes of the quadratic polynomial $p(x) = ax^2 + bx + c, a \neq 0$, then it is known that $x - \alpha$ and $x - \beta$ are the factors of $p(x)$.

  a) $A + \beta = -\frac{b}{a}$

  b) $\alpha\beta = \frac{c}{a}$

- **Division Algorithm for Polynomials:**
  - If $p(x)$ and $g(x)$ are any two polynomials with $g(x) \neq 0$, then polynomials $q(x)$ and $p(x) = g(x) \times q(x) + r(x)\ r(x)$ can be found such that , where $r(x) = 0$ or degree of $r(x) <$ degree of $g(x)$.
  - This result is known as the Division Algorithm for polynomials.

- An example would make it easier to understand. So, consider a cubic polynomial $x^3 - 3x^2 - x + 3$.

- Assuming that one of its zeroes is 1, it is clear that $x - 1$ is a factor of $x^3 - 3x^2 - x + 3$.

- So, $x^3 - 3x^2 - x + 3$ can be divided by $x - 1$. Taking out this factor, $(x - 1)(x^2 - 2x - 3)$.

- Next, get the factors of $x^2 - 2x - 3$ by splitting the middle term. $(x + 1)(x - 3)$.
  $x^3 - 3x^2 - x + 3 = (x - 1)(x + 1)(x - 3)$

- So, all the three zeroes of the cubic polynomial are $1, -1, 3$.