Lecture 1

Module 01

CHAPTER NO. 2

POLYNOMIALS

E X P R E S S I O N

P O L Y N O M I A L

Coefficient Coefficient

$2x + 5y$

0, 1, 2, 3, 4, 5,...

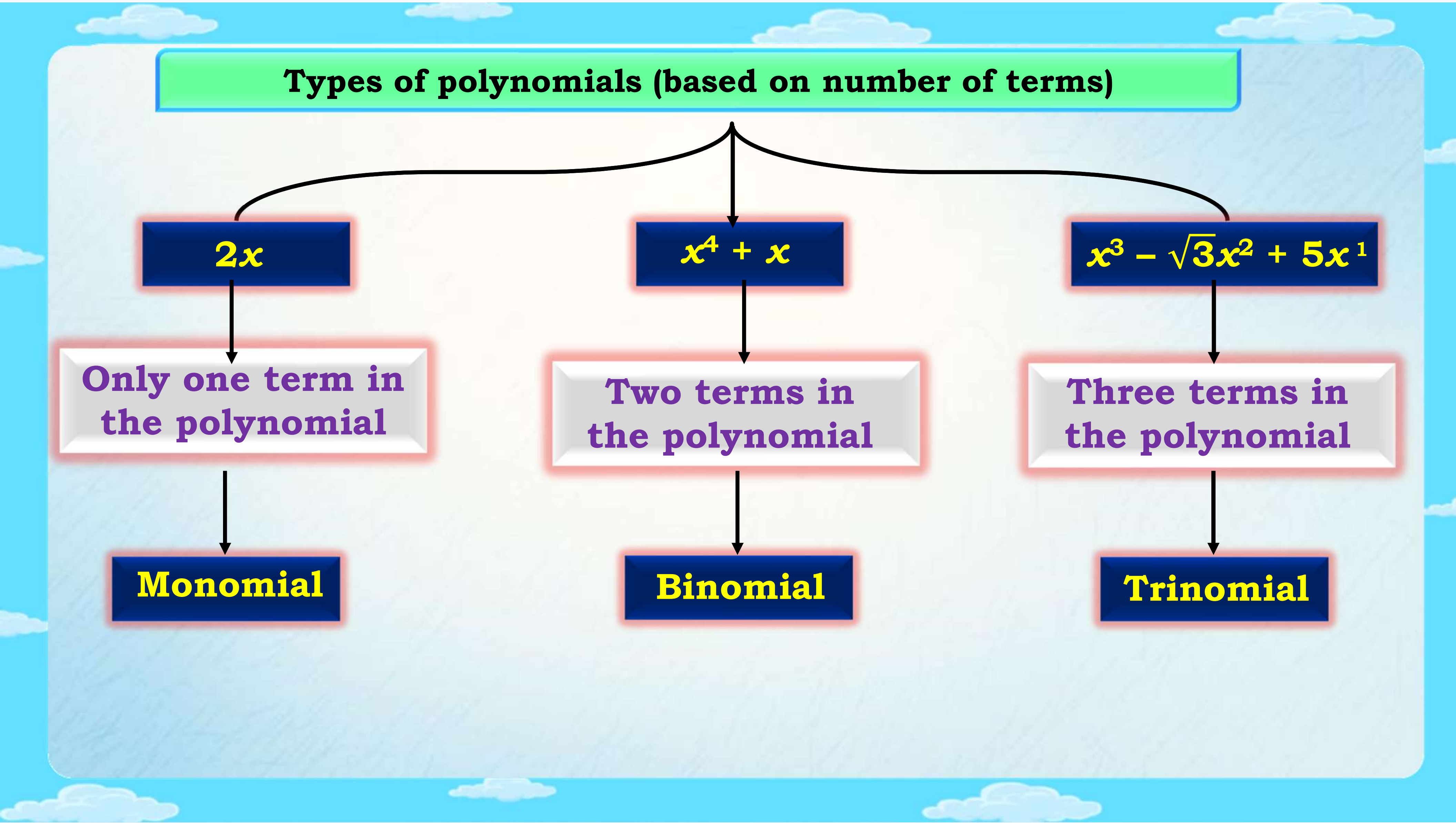
Variable Variable

✓ $2x^{1} + 5y^{1}$ ✓ $2y^{3} + 7x^{2} - y^{1}$ ✓ $y^{2} - 17y^{0}$

2 x 5

✗ $3x^{\frac{2}{3}} - x^{2}$ ✗ $x_{y}^{-1} + 5x^{0}$

Polynomial is an expression in which all the powers of variables are whole numbers.



Types of polynomials (based on number of terms)
$2x$
Only one term in the polynomial
Monomial
$x^4 + x$
Two terms in the polynomial
Binomial
$x^3 - \sqrt{3}x^2 + 5x^1$
Three terms in the polynomial
Trinomial

Types of polynomial (based on degree)

$7y^{1}$	$2y^{2} + y + 1$	$x^{3} + x^{2} + 2x + 3$
Degree 1	Degree 2	Degree 3
Linear polynomial	Quadratic polynomial	Cubic polynomial

Module 02

Value of a polynomial

If p(x) is a polynomial in x and if k is any real number, then the value obtained by putting x = k in p(x), is called the value of the polynomial p(x) at x = k.

The value of $p(x)$ at $x = k$ is denoted by $p(k)$

e.g. If $\quad p(x) = x^2 - 4x + 5$

then, $\quad p(4) = (4)^2 - 4(4) + 5$

$= \cancel{16} - \cancel{16} + 5$

$= 5$

Replace x by 4

Zeroes of a Polynomial

T… h the value of the p… oes of the polynomial.

e…

Value of a polynomial become zero for $x = 1$

1 is called zero of a polynomial

If $x = 1$, $\quad p(1) = 2(1)^3 - 3(1)^2 - 2(1) + 3$

$= \cancel{2} - \cancel{3} - \cancel{2} + \cancel{3}$

$= 0$

Replace x by 1

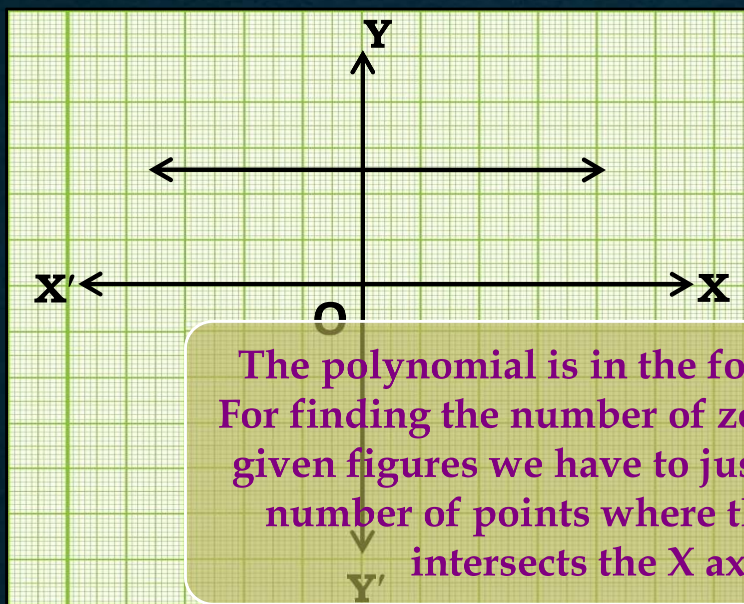
$\therefore$ 1 is a zero of $p(x)$

Module 03

Exercise 2.1

Q. 1 **The graphs of y = p(x) are given below, for some polynomials p(x). Find the number of zeroes of p(x), in each case.**

(i)



Given line is intersecting X axis at how many points ?

Given line does not intersect the X axis at any point

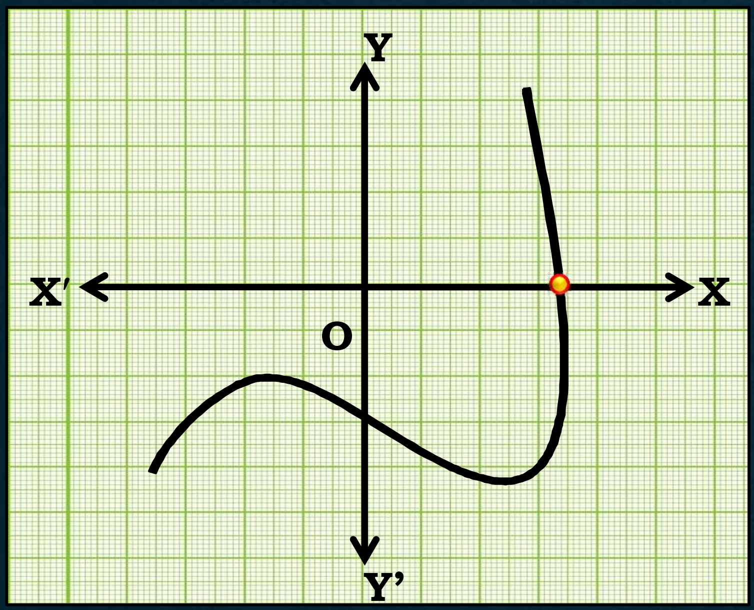
The polynomial is in the form y = p(x), For finding the number of zeroes for the given figures we have to just check the number of points where the graphs intersects the X axis

Sol. **The number of zeroes is 0, because the graph does not intersect the X - axis at any point.**

EXERCISE 2.1

Q. 1 **The graphs of y = p(x) are given below, for some polynomials p(x). Find the number of zeroes of p(x), in each case.**

(ii)

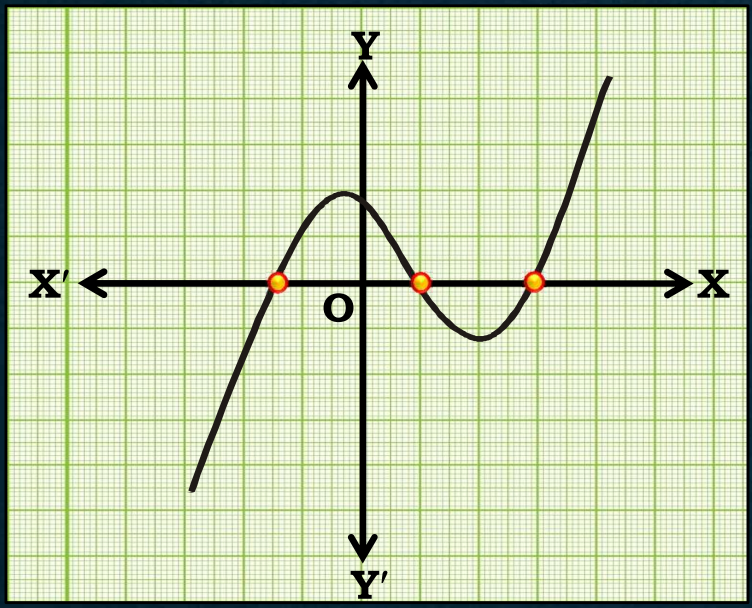


Sol. **The number of zeroes is 1, because the graph intersects the X - axis at one point.**

EXERCISE 2.1

Q. 1 The graphs of $y = p(x)$ are given below, for some polynomials $p(x)$. Find the number of zeroes of $p(x)$, in each case.

(iii)

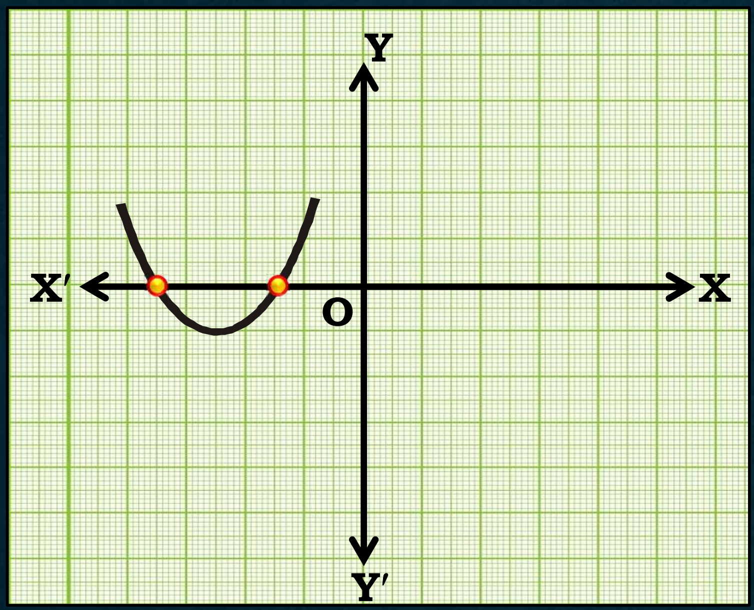


Sol. The number of zeroes is 3, because the graph intersects the X - axis at three points.

EXERCISE 2.1

Q. 1 The graphs of $y = p(x)$ are given below, for some polynomials $p(x)$. Find the number of zeroes of $p(x)$, in each case.

(iv)

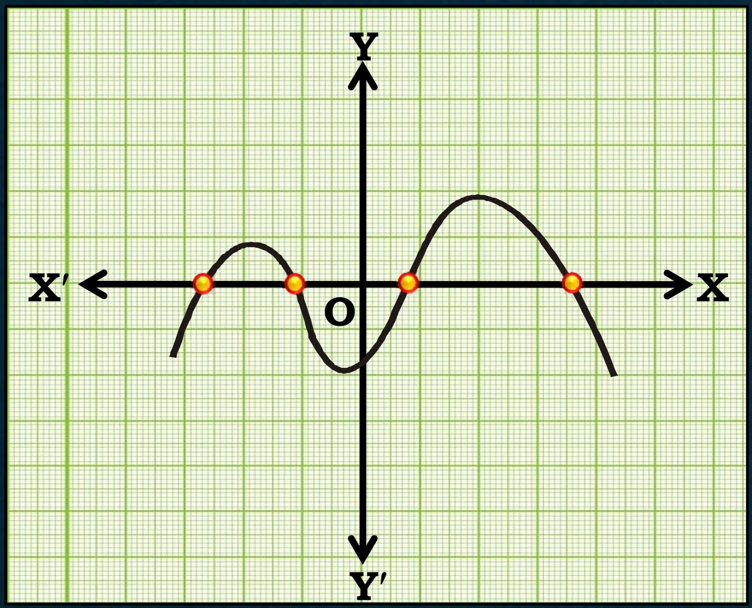


Sol. The number of zeroes is 2, because the graph intersects the X - axis at two points.

EXERCISE 2.1

Q. 1 The graphs of $y = p(x)$ are given below, for some polynomials $p(x)$. Find the number of zeroes of $p(x)$, in each case.

(v)

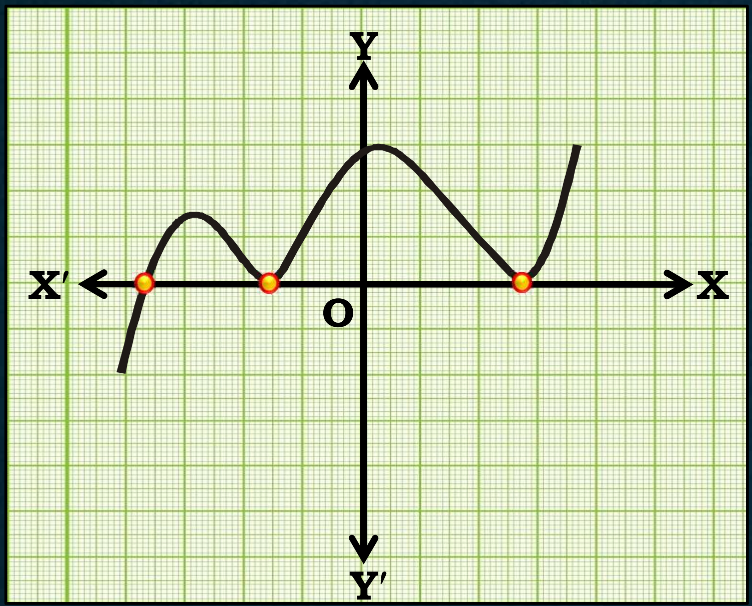


Sol. The number of zeroes is 4, because the graph intersects the X - axis at four points

EXERCISE 2.1

Q. 1 The graphs of $y = p(x)$ are given below, for some polynomials $p(x)$. Find the number of zeroes of $p(x)$, in each case.

(vi)



Sol. The number of zeroes is 3, because the graph intersects the X - axis at three points.

Module 04

Relationship between zeroes and coefficients of a Quadratic Polynomial

- If α and β are zeroes of $p(x) = ax^2 + bx + c$, then

Sum of the zeroes $= \alpha + \beta = \dfrac{-(\text{coefficient of } x)}{\text{coefficient of } x^2} = \dfrac{-b}{a}$

Product of the zeroes $= \alpha\beta = \dfrac{\text{Constant term}}{\text{coefficient of } x^2} = \dfrac{c}{a}$

Exercise 2.2

Q. 1 Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients :

i) $1x^2 - 2x - 8$

Sol: $1x^2 - 2x - 8$ $\quad 8 \times 1 = 8$

$= x^2 - 4x + 2x - 8$

$= x(x - 4) + 2(x - 4)$

$= (x - 4)(x + 2)$

$\therefore$ $(x - 4)$ and $(x + 2)$ are the factors of $x^2 - 2x - 8$

So, the value of $x^2 - 2x - 8$ is zero when $x - 4 = 0$ or $x + 2 = 0$,

$\therefore$ $x - 4 = 0$ or $x + 2 = 0$

$\therefore$ $x = 4$ or $x = -2$

$\therefore$ The zeroes are 4 and -2

Now, Sum of zeroes $= 4 + (-2) = 2$ ...(i)

8

1 8

$8 - 1 \neq 2$

$+2 \quad -4$

$4 - 2 = 2$

We know, $\alpha + \beta = \dfrac{-(\text{coefficient of } x)}{\text{coefficient of } x^2}$

$= \dfrac{-(-2)}{1}$

$= 2$ ...(ii)

Hence verified from (i) and (ii)

Product of zeroes $= 4 \times (-2) = -8$ ...(iii)

We know, $\alpha \times \beta = \dfrac{\text{constant term}}{\text{coefficient of } x^2}$

$= \dfrac{-8}{1}$

$= -8$ ...(iv)

Hence verified from (iii) and (iv)