ODM EDUCATIONAL GROUP
Changing your Tomorrow

# POLYNOMIALS

## INTRODUCTION

**SUBJECT : MATHEMATICS**
**CHAPTER NUMBER: 02**
**CHAPTER NAME : POLYNOMIALS**



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# Learning outcome

1..Students will be able to define polynomial.

2.Students will be able to know the types of polynomials.

3.Students will be able to know the general form of linear, quadratic & cubic polynomial.

4. .Students will be able to know geometrical meaning of the zeros of a polynomial.

Introduction about polynomials ,its types and zero of a polynomial.
https://youtu.be/NmpmGuNNqfI {4.50}

# POLYNOMIALS IN ONE VARIABLE

- ***A <u>polynomial p(x) in one variable</u> x*** is analgebraic expression in x of the form

  $p(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_2 x^2 + ax + a_0$,

  where $a_0, a_1, a_2, \ldots, a_n$ are **constants(realnumbers)** and $a_n \neq 0$.

  $a_0, a_1, a_2, \ldots, a_n$ are respectively the **coefficients**of $x_0$, x, $x_2$, . . ., $x_n$, and **n** is called **the degree of the polynomia**l. Each of $a_n x^n$ , $a_{n-1} x^{n-1}$ , . . . ,$a_2 x^2$ ,ax , $a_0$is called a **term** of the polynomial $p(x)$.

**In particular,**if $a_0 = a_1 = a_2 = \ldots = a_n$ *= 0(all the constants are zero), we get* the **<u>zero polynomial</u>,** which is denoted by 0.The **degree** of the zero polynomial is ***not defined***

- Geometrical meaning of the zeroes of a polynomial
- https://youtu.be/mBF7Gd7eiNo {5.32}

A real number '$a$' is a ***zero* of a polynomial** $p(x)$ if

$p(a) = 0$. In this case, $a$ is also called a *root* of theequation $p(x) = 0$.

Every **linear polynomial** in one variable has a**unique zero**, a non-zero constant polynomialhas no zero, and every real number is a zero ofthe zero polynomial.

A **quadratic polynomial** can have at most **2 zeroes** and **a cubic polynomia**l can have atmost **3 zeroes**

**Geometrical Meaning of the Zeroes of a Polynomial**

The linear polynomial $ax + b$, $a \neq 0$, has exactly one zero, namely –b/a the $x$-coordinate of the point wherethe graph of $y = ax + b$ intersects the $x$-axis.Example : The zero of the linear polynomial -2x +5 is 5/2 the point where the graph of y = -2x+ 5 meets the x axis.

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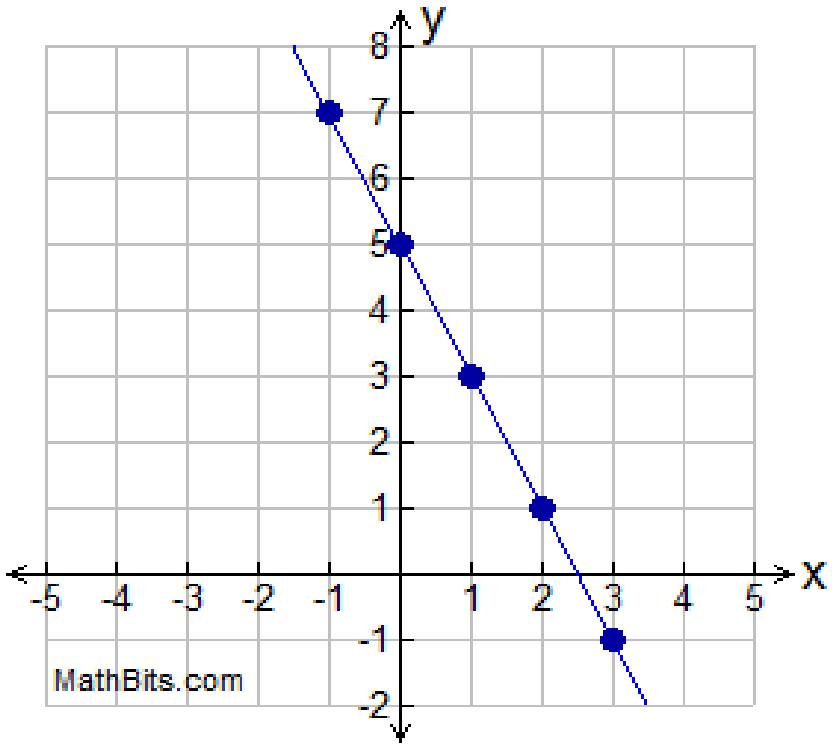
# GRAPH OF LINEAR EQUATION Y= -2X + 5

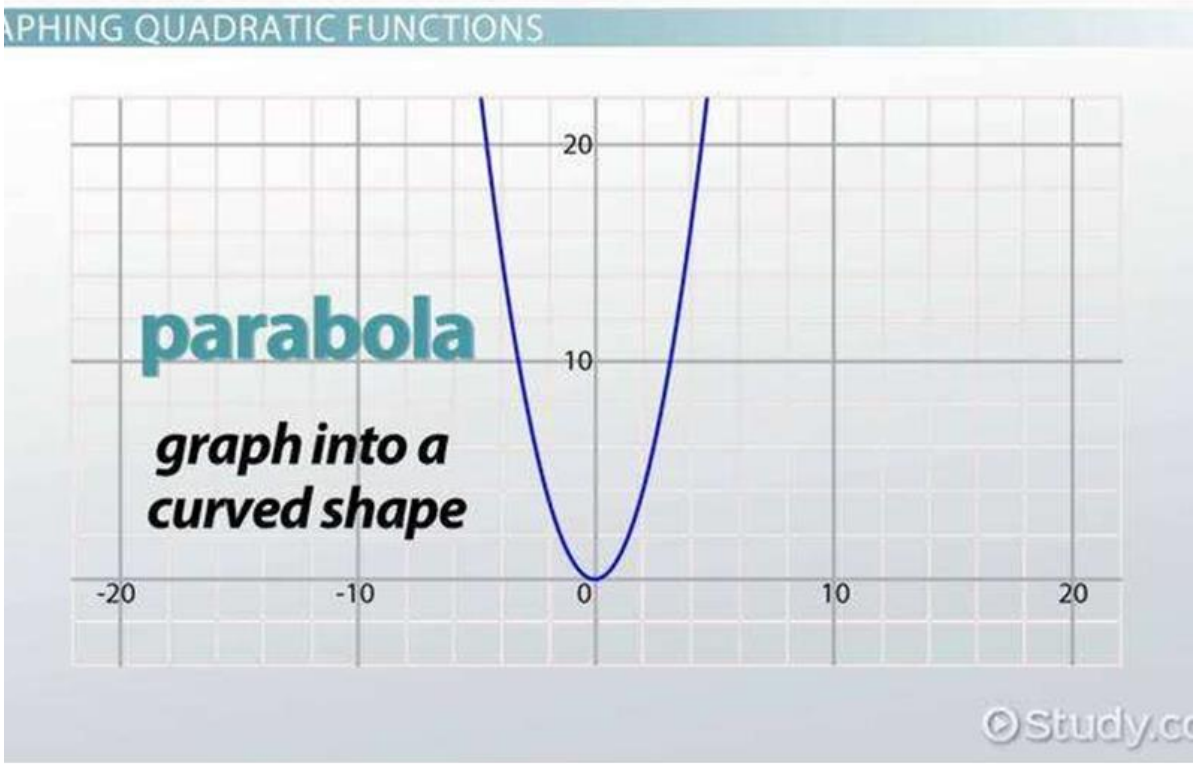


For any quadratic polynomial $ax^2 + bx + c$, $a \neq 0$,the graph of the corresponding equation

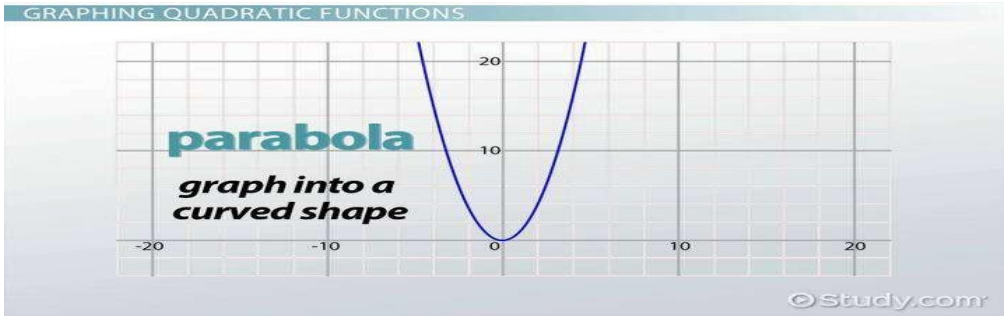
$y = ax^2 + bx + c$ has one of the two shapes U eitheropen upwards or open downwards depending on whether $a > 0$ or $a < 0$.

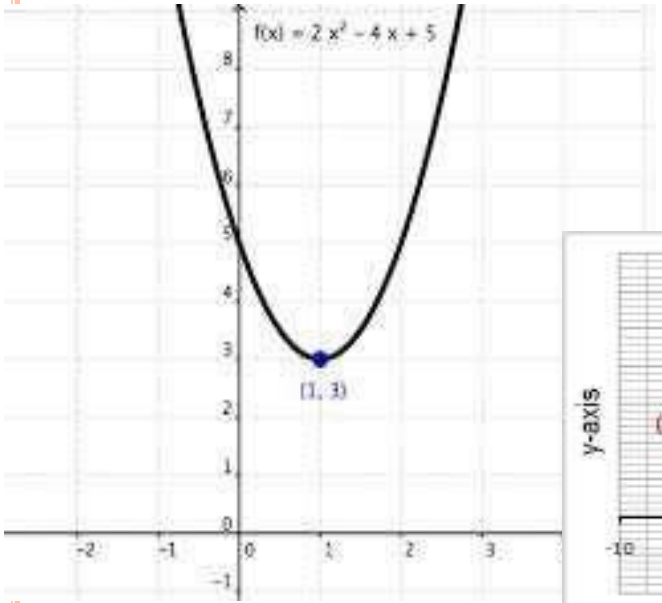
These curves are called **parabolas.**

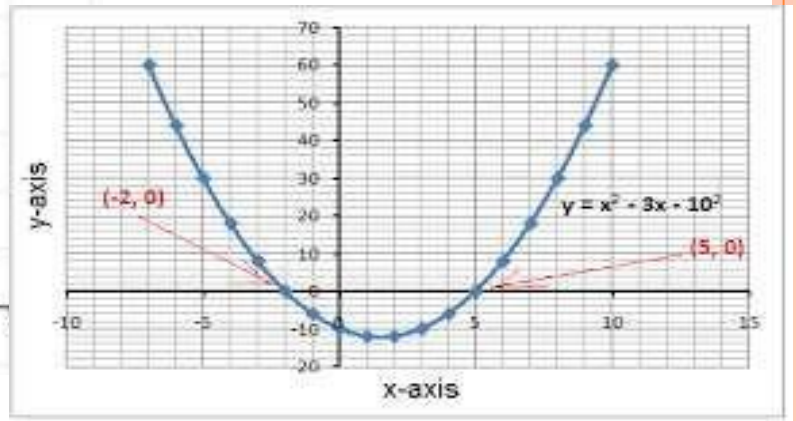
**A parabola is a plane curve which is mirrorsymmetrical and approximately U-shaped.**



- The **zeroes of a quadratic polynomial** $ax^2 + bx + c$, $a \neq 0$, areprecisely the ***x*-coordinates** of thepoints where the **parabola** representing $y = ax^2 + bx + c$ **intersects the *x*-axis**
- We can see geometrically, from the following graphs, that a quadratic polynomial can have either two distinct zeroes or two equal zeroes (i.e., one zero), or no zero. This also means that a polynomial of degree 2 has at most two zeroes




f(x) = 2 x² − 4 x + 5
(1, 3)


y = x² - 3x - 10
(-2, 0)
(5, 0)
y-axis
x-axis

General form of linear polynomials $ax + b\ where\ a \neq 0$

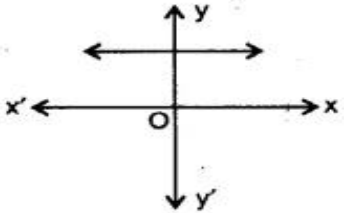
General from of quadratic polynomials $ax^2 + bx + c$ where a≠O

General form of cubic polynomial$ax^3 + bx^2 + cx + d, where a\ a \neq 0$,

The number of zeroes of p(x) in each graph given; are

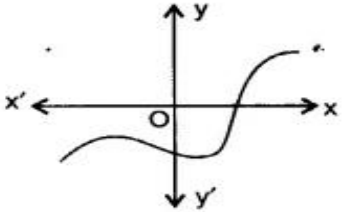


(*i*)



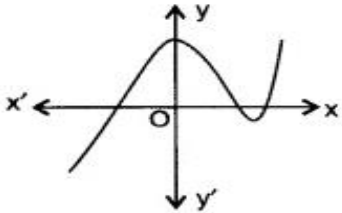

This graph shows $p(x)$ has no zero.

(*ii*)



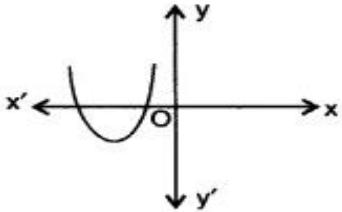

This graph shows $p(x)$ has one zero.

(*iii*)



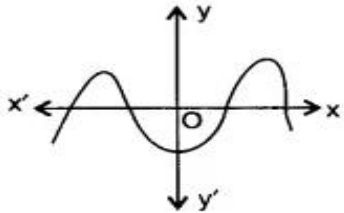

This graph shows $p(x)$ has three zeroes.

(*iv*)



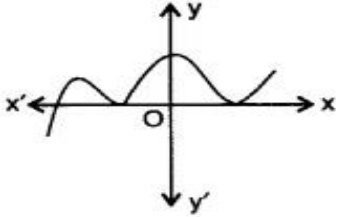

This graph shows $p(x)$ has two zeroes.

(*v*)




This graph shows $p(x)$ has four zeroes.

(*vi*)




This graph shows $p(x)$ has three zeroes.

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HOME ASSIGNMENT Ex. 2.1 Q. No 1

AHA

1.Draw the graph of $x^2-3x-4$

2. Draw the graph of $x^3- 4x$

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# THANKING YOU

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