# POLYNOMIALS

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An Algebric expression in which exponent of the variable is a whole number.

## TYPES OF POLYNOMIAL (on the basis of terms)

Monomials → $4x^2$
Binomials → $4x^2+6x$.
Trinomials → $4x^2+6x+2$.
Quadrinomials → $4x^3+6x^2+5x+2$

## TYPES OF POLYNOMIAL (on the basis of Degree)

Constant polynomial ⇒ 3, 5
Linear polynomial ⇒ $p(x) = ax+b$
Quadratic polynomial ⇒ $p(x) = ax^2+bx+c$
Cubic polynomial ⇒ $p(x) = ax^3+bx^2+cx+d$.
Biquadratic polynomial ⇒ $p(x) = ax^4+bx^3+cx^2+dx+e$

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## Zero of a Polynomial

A Real number $k$ is said to be a zero of a polynomial $p(x)$ if $p(k) = 0$.

⇒ zero of a polynomial, $ax+b \Rightarrow a \neq 0$. is $-\frac{b}{a}$ ⇒ $\frac{\text{~~Coeff. of~~ constant term}}{\text{coefficient of } x}$.

eg. suppose $p(x) \Rightarrow 2x-4$.

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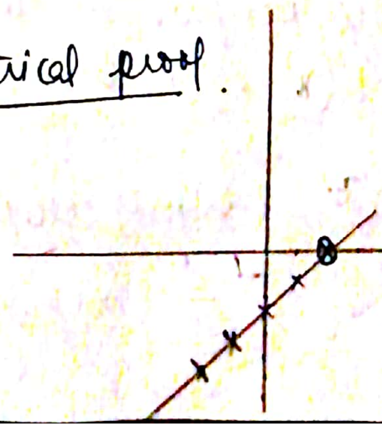
so, at what value of $x$ ⇒ $p(x)=0$, is called Zero of polyn.

$p(x) = 2x-4$.
if $p(x)=0$
$2x-4=0$
$x=2$ means
at $x=2$, $p(x)=0$,

Geometrical proof.



$x=2, p(x)=0$
is called
zero.

## Relationship betⁿ zeroes and coefficients of quadratic polynomials.

Any Quadratic polynomial is given by

$$p(x) = ax^2 + bx + c$$

If $\alpha$ and $\beta$ are zeroes of quadratic polynomial then,

(i) sum of zeroes $(\alpha+\beta) = \dfrac{-[\text{Coefficient of } x]}{[\text{Coefficient of } x^2]} = -\dfrac{b}{a}.$

(ii) product of zeroes $(\alpha\beta) = \dfrac{(\text{constant term})}{\ldots} = \dfrac{c}{a}$

The Quadratic polynomial with zeroes $\alpha$ and $\beta$ is given by.

$$k[x^2 - (\text{sum of zeroes})x + (\text{product of zeroes})]$$

## ~~Relationship bet zeroes and coefficients of cubic polynomials~~

Any cubic polynomial is given by,

$$p(x) = ax^3 + bx^2 + cx + d.$$

If $\alpha$, $\beta$ and $\gamma$ are the zeroes of cubic polynomials, then

(i) sum of zeroes, $(\alpha+\beta+\gamma) \Rightarrow -\dfrac{b}{a}.$

(ii) sum of product of zeroes taken two at a time $(\alpha\beta+\beta\gamma+\gamma\alpha) = \dfrac{c}{a}.$

(iii) product of zeroes $(\alpha\beta\gamma) = \dfrac{-d}{a}.$

The cubic polynomials with zeroes $\alpha$, $\beta$, $\gamma$ is given by,

$k(x-\alpha)(x-\beta)(x-\gamma)$ is

$\cancel{k[x^3 - (\text{sum of zeroes})x^2 + (\text{prod}}$

$$k[x^3 - (\alpha+\beta+\gamma)x^2 + (\alpha\beta+\beta\gamma+\gamma\alpha)x + (\alpha\beta\gamma)] = 0$$