



Mathematics Class X

Chapter -4

Quadratic Equations

Module-1/3

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Learning outcomes in module 1/3 are:

- Recall Quadratic Polynomial.
- Defining Quadratic Equation.
- Identifying Quadratic Equations.
- Representing situations in the form of Quadratic equations.

Quadratic Polynomial

- A polynomial of degree two is known as **quadratic polynomial**.
- $P(x) = ax^2 + bx + c$ is a quadratic polynomial where $a \neq 0$ & a, b & c are real numbers.

Eg: $2x^2 - 7x + 5$, $-8y - y^2 - 1280$

Quadratic Equation:

- A **quadratic equation** in the variable x is an equation of the form $ax^2 + bx + c = 0$, where a, b, c are real numbers, $a \neq 0$.
- For example, $2x^2 - 7x + 5 = 0$ is a quadratic equation.
Similarly, $x^2 - 2x - 2 = 0$, $x^2 - 5x + 6 = 0$, are also quadratic equations.
- Any equation of the form $p(x) = 0$, where $p(x)$ is a polynomial of degree 2, is a quadratic equation.

Standard form of a quadratic equation:

$ax^2 + bx + c = 0$, $a \neq 0$ is called the standard form of a quadratic equation.

Eg: $x^2 + 32x - 273 = 0$, $2x^2 - 13x + 9 = 0$

Identifying the quadratic equations.

Check whether the following are quadratic equations:

$$(i)(x-2)(x+5)=(x-3)(x+4)+x^2$$

Solution: Given equation is $(x-2)(x+5)=(x-3)(x+4)+x^2$

$$\text{i.e, } x^2+3x-10=x^2-x-12+x^2$$

$$\text{i.e, } x^2-2x-2=0$$

which is of the form $ax^2 + bx + c = 0$.

So, it is a quadratic equation.

$$(ii) x^2 - 3x + 5 = (x + 5)^2$$

Solution: Given equation is $x^2 - 3x + 5 = (x + 5)^2$

$$\text{i.e, } x^2 - 3x + 5 = x^2 + 10x + 25$$

$$\text{i.e, } 13x + 20 = 0$$

which is not of the form $ax^2 + bx + c = 0$.

So, it is not a quadratic equation.

$$(iii) \ x^3 - 3x^2 + 5x = (x-2)^3$$

Solution: Given equation is $x^3 - 3x^2 + 5x = (x-2)^3$

$$\text{i.e, } x^3 - 3x^2 + 5x = x^3 - 6x^2 + 12x - 8$$

$$\text{i.e, } 3x^2 - 7x + 8 = 0$$

which is of the form $ax^2 + bx + c = 0$.

So, it is a quadratic equation.

100% Scoring Tips

If question is "Is the equation $x^2+6x+\sqrt{x}-3=0$ a quadratic equation?"

Then, **solution** is given as $x^2+6x+\sqrt{x}-3=0$ is not a quadratic polynomial ,because of \sqrt{x} , hence it is **not a quadratic equation**.

Be Careful: But don't solve as , Yes it is a quadratic equation, as the degree of equation is 2. This is a wrong statement.

Representing situations in quadratic form

1. The area of a rectangular plot is 528m^2 . The length of the plot (in metres) is one more than twice its breadth. We need to find the length & breadth of the plot.

Solution: Let breadth of the rectangular plot be x m

So, length of the plot $= (2x + 1)\text{m}$

Area of a rectangular plot $= (2x + 1)x = 528$

i.e, $2x^2 + x - 528 = 0$

which is the required quadratic equation.

2. Rohan's mother is 26 years older than him. The product of their ages(in years) 3 years from now will be 360. We would like to find Rohan's present age.

Solution: let present age of Rohan be x years.

Rohan's mother's present age be $(x+26)$ years.

After 3 years, Rohan's age = $(x+3)$ years

After 3 years, Rohan's mother's age = $(x+26+3)$ years

ATQ $(x+3)(x+29)=360$

i.e $x^2 + 32x - 273 = 0$ which is the required quadratic equation.



Thank You