CLASS X CHAPTER 5 (QUADRATIC EQUATIONS IN ONE VARIABLE)

General direction for the students :-Whatever be the notes provided , everything must be copied in the Maths Copy and then do the Home work in the same Copy.

Definition :- An equation is of the form $ax^2 + bx + c = 0$, $where\ a, b\ and\ c\ are\ real\ numbers\ a \neq 0$, is a quadratic in the variable x.

Roots (or Solutions) of a quadratic equations

It is the value of the variable , which satisfies the given quadratic equation.

eg:- A number α is a root of the quadratic equation $ax^2 + bx + c = 0$ if and only if $a\alpha^2 + b\alpha + c = 0$.

NOTE:- Simplify the given equation before deciding whether it is a quadratic or not.

EXERCISE 5.1

Q1 v). $x + \frac{2}{x} = x^2$

$\Rightarrow \frac{x^2+2}{x} = x^2$

$\Rightarrow x^2 + 2 = x^3$

This not the form of quadratic.

$\Rightarrow$ the given equation is not a quadratic.

Q2 i). $x^2 - x + 1 = 0\ ;\ 1\ , -1$

When $x = 1$

$\Rightarrow 1^2 - 1 + 1$

$\Rightarrow 1 \neq 0$

$\Rightarrow x = 1$, is not a root.

When $x = -1$

$\Rightarrow (-1)^2 - (-1) + 1$

$\Rightarrow 1+1+1$

$\Rightarrow 3 \neq 0$ $\Rightarrow x = -1$, is also not a root.

Q6). $px^2 + 7x + q = 0$; $\frac{2}{3}$, -3

When $x = \frac{2}{3}$

$\Rightarrow p\left(\frac{2}{3}\right)^2 + 7\left(\frac{2}{3}\right) + q = 0$

$\Rightarrow 4p + 42 + 9q = 0$

$\Rightarrow 4p + 9q = -42$ ----------(1)

Also , when $x = -3$

$\Rightarrow p(-3)^2 + 7(-3) + q = 0$

$\Rightarrow 9p + q = 21$ ----------(2)

eqn(2)×9

$\Rightarrow 81p + 9q = 189$ ----------(3)

eqn(1) – eqn(3)

$\Rightarrow -77p = -231$

$\Rightarrow$ p=3

Sub. In eqn(2)

$\Rightarrow 27 + q = 21$

$\Rightarrow q = -6.$

HOME WORK :- Left over questions from the exercise 5.1.

SOLVING A QUADRATIC EQUATION BY FACTORISATION

Procedure:

Step 1. Clear all fractions (if any).

Step 2. Write the given equation in the form $ax^2 + bx + c = 0$.

Step 3. Factorise the left side into product of two linear factors.

Step 4. Equate each part with zero (Zero-product rule) , and solve the linear equation.

Note 1 : The roots may be checked by substituting in the original equation.

Note 2: When the squaring of both sides of the equation is done, the roots of the final equation must be checked to determine whether they are roots of the original equation or not. Although no root of the original equation will be lost by squaring but certain values may be introduced (Extraneous Solution) which are roots of the new equation but not of the original equation.

EXERCISE 5.2

Q 1ii) Solve $\frac{x^2-5x}{2} = 0$

$\Rightarrow x^2 - 5x = 0$, *by cross multiplying*

$\Rightarrow x(x-5) = 0$ *note this step*

$\Rightarrow x = 0, 5$ *are the roots.*

Q3 ii) Solve $x(2x+5) = 3$

$\Rightarrow 2x^2 + 5x - 3 = 0$ *note the step*

$\Rightarrow 2x^2 + 5x - 3 = 0$

$\Rightarrow 2x^2 + 6x - x - 3 = 0$ by *breaking the middle term*

$\Rightarrow 2x(x+3) - 1(x+3) = 0$

$\Rightarrow (x+3)(2x-1) = 0$

$\Rightarrow x = -3, \frac{1}{2}$ are the roots.

Q 6 ii). Solve $\frac{2}{3}x^2 - \frac{1}{3}x = 1$

$\Rightarrow 2x^2 - x - 3 = 0$ *by simplifyingqu*

$\Rightarrow 2x^2 - 3x + 2x - 3 = 0$ by *breaking the middle term*

$\Rightarrow x(2x-3) + 1(2x-3) = 0$

$\Rightarrow (2x-3)(x+1) = 0$

$\Rightarrow x = \frac{3}{2}, -1$ are the roots.

HOME WORK:

Exercise 5.1 Left over questions.

Exercise 5.2 Left over questions up to question number 10.