



STEPPING STONE
SCHOOL (HIGH)

CLASS : X

Subject: Mathematics

Date: 24/4/2020

Topic: Quadratic Equation

Time Limit: 1 hour

Worksheet No. : 6

[Copy the questions and solve them on a sheet of paper date wise. Keep the worksheets ready in a file to be submitted on the opening day.]

Concept :

1) Solve i) $x^2=4$ ii) $x^4=16$ iii) $x^3=1$ iv) $x^2=61$

Ans i) $x^2=4 \Rightarrow x^2 - 4=0 \Rightarrow x^2-2^2=0$

$(x+2)(x-2)=0 \Rightarrow$ Either $x+2=0$ or $x-2=0 \Rightarrow x=-2$ or $x=+2$

Hence solution is $x= \pm 2$

so

$X^2 = a^2 \Rightarrow x = \pm a$

Now (iv) $\Rightarrow x^2=61 \Rightarrow x^2=(\sqrt{61})^2 \Rightarrow x=\pm\sqrt{61}$

$$\text{ii) } X^4=16 \Rightarrow x^2 - 4^2=0 \Rightarrow (x^2+4)(x^2-4)=0$$

$$\Rightarrow X^2+4=0 \text{ or } x^2=4 \text{ and } x^2=-4$$

Which does not give the real solution ;-

$X=\pm\sqrt{-4}$ is an imaginary number

$$\text{From } x^2=4 \Rightarrow x^2=2^2 \Rightarrow x=\pm 2$$

Hence there are four roots viz two real and two imaginary .In higher class you will learn that n degree equation will give n roots hence cubic equation $x^3=1$, Should have three roots.hence cubic equation $x^3=1$ should have three roots.

To realise it we have to learn Shreedhar Acharya formula $x=(-b \pm \sqrt{(b^2-4ac)})/2a$ from $ax^2+bx+c=0$
 $\Rightarrow x^2+b/(a.x) +c/a=0$

$$\Rightarrow x^2+2x.b/2a+c/a=0 \Rightarrow x^2 + 2x(b/2a)+(b/2a)^2$$

$$=(b/2a)^2 -c/a \Rightarrow (x+b/2a)^2 = (b^2-4ac)/4a^2$$

$$\Rightarrow x + b/2a = \pm \sqrt{(b^2-4ac))/4a^2} = \pm \sqrt{(b^2-4ac)}/2a \text{ as } X^2=R$$

$$\Rightarrow X=\pm\sqrt{R}$$

$$\Rightarrow x=(-b/2a).(\pm \sqrt{(b^2-4ac)})/2a \text{ (practice and prove it)}$$

Now iii) $x^3 = 1 \Rightarrow x^3 - 1^3 = 0 \Rightarrow (x-1)(x^2+x+1) = 0$
 $\Rightarrow x=1$ or $x^2 + x + 1 = 0$ here $a=1$, $b=1$ and $c=1$ general
equation $ax^2+bx+c=0$, $\Rightarrow x = \frac{-1 \pm \sqrt{-3}}{2}$

Which are imaginary roots

Exercise

Solve i) $x^2=5x$ ii) $x/(x-1) + (x-1)/x = 5/2$

iii) $(x+1)(2x+8) = (x+7)(x+3)$

iv) $X^2 - (a+b)x + ab = 0$

v) $(3x-2)/(2x-3) = (3x-8)/(x+4)$

vi) $4/(x+2) - 1/(x+3) = 4/(2x+1)$

vii) $(1+1/x)(1-1/x-1) = 7/8$