Pakistan School
Kingdom of Bahrain

WELCOME CLASS 10TH (SCIENCE)

Quadratic Equations

Objectives

Students will be able to:

Solve equations which are convertible to quadratic equations

Q. Solve the following equations

(7). $\frac{x}{x-3}+4\left(\frac{x-3}{x}\right)=4$

$Solution: \frac{x}{x-3}+4\left(\frac{x-3}{x}\right)=4$

$Let\ \frac{x}{x-3}=y \Rightarrow \frac{x-3}{x}=\frac{1}{y}$

$Equcaton\ become$

$y+4\left(\frac{1}{y}\right)=4$

$Multiplying\ both\ side\ by\ "y"$

$y^2+4=4y$

$y^2-4y+4=0$

$y^2-2y-2y+4=0$

$y(y-2)-2(y-2)=0$

$(y-2)(y-2)$

$y-2=0 \Rightarrow y=2$

$Put\ the\ value\ of\ y$

$\frac{x}{x-3}=2 \Rightarrow x=2(x-3)$

$x=2x-6 \Rightarrow 6=2x-x$

$x=6$

$S.Set=\{6\}$

(10). $x^4-2x^3-2x^2+2x+1=0$

Solution:

$$x^4-2x^3-2x^2+2x+1=0$$

Dividing both sides by "x^2"

$$\frac{x^4}{x^2}-\frac{2x^3}{x^2}-\frac{2x^2}{x^2}+\frac{2x}{x^2}+\frac{1}{x^2}=\frac{0}{x^2}$$

$$x^2-2x-2+\frac{2}{x}+\frac{1}{x^2}=0$$

$$\left(x^2+\frac{1}{x^2}\right)-2x+\frac{2}{x}-2=0$$

$$\left(x^2+\frac{1}{x^2}\right)-2\left(x-\frac{1}{x}\right)-2=0 \quad \text{.....(1)}$$

Let $x-\frac{1}{x}=y$ .....(2)

Taking square on both sides

$$\left(x-\frac{1}{x}\right)^2=(y)^2$$

$$x^2+\frac{1}{x^2}-2=y^2$$

$$x^2+\frac{1}{x^2}=y^2+2$$

Putting values in eq.(1)

$$y^2+2-2(y)-2=0$$

$$y^2-2y=0$$

$$y(y-2)=0$$

$y=0$ $\qquad$ $y-2=0$

$y=0$ $\qquad$ $y=2$

Put $y = x - \frac{1}{x}$ *from eq.2*

$x - \frac{1}{x} = 0 \qquad x - \frac{1}{x} = 2$

$\frac{x^2 - 1}{x} = 0 \qquad \frac{x^2 - 1}{x} = 2$

$x^2 - 1 = 0 \qquad x^2 - 1 = 2x$

$x^2 = 1 \qquad x^2 - 2x - 1 = 0$

$\sqrt{x^2} = \pm\sqrt{1} \qquad 1x^2 - 2x - 1 = 0$

$x = \pm 1$

Solving $1x^2 - 2x - 1 = 0$ *by quadratic formula*

$a = 1 \quad b = -2 \quad c = -1$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4a(1)(-1)}}{2(1)}$$

$$x = \frac{+2 \pm \sqrt{4+4}}{2}$$

$$x = \frac{2 \pm \sqrt{8}}{2}$$

$$x = \frac{2 \pm \sqrt{4 \times 2}}{2}$$

$$x = \frac{2 \pm 2\sqrt{2}}{2}$$

$$x = \frac{2(1 \pm \sqrt{2})}{2}$$

$$x = 1 \pm \sqrt{2}$$

$$S.Set = \left\{\pm 1, 1 \pm \sqrt{2}\right\}$$

Activity

Q. Solve the following equation

$$\frac{4x+1}{4x-1}+\frac{4x-1}{4x+1}=2\frac{1}{6}$$

Solution

$$Solution: \frac{4x+1}{4x-1}+\frac{4x-1}{4x+1}=2\frac{1}{6}....(1)$$

$$\frac{4x+1}{4x-1}=y....(2) \Rightarrow \frac{4x-1}{4x+1}=\frac{1}{y}$$

Equation (1) become

$$y+\frac{1}{y}=2\frac{1}{6}$$

$$y+\frac{1}{y}=\frac{13}{6}$$

Multiplying both sides by "6y"

$$6y^2+6=13y$$

$$6y^2-13y-6=0$$

$$6y^2-9y-4y-6=0$$

$$3y(2y-3)-2(2y-3)=0$$

$$(2y-3)(3y-2)$$

$$2y-3=0 \qquad 3y-2=0$$

$$2y=3 \qquad 3y=2$$

$$y=\frac{3}{2} \qquad y=\frac{2}{3}$$

$$\frac{4x+1}{4x-1}=\frac{3}{2} \qquad \frac{4x+1}{4x-1}=\frac{2}{3}$$

$$2(4x+1)=3(4x-1) \qquad 3(4x+1)=2(4x-1)$$

$$8x+2=12x-3 \qquad 12x+3=8x-2$$

$$2+3=12x-8x \qquad 12x-8x=-2-3$$

$$5=4x \qquad 4x=-5$$

$$x=\frac{5}{4} \qquad x=-\frac{5}{4}$$

$$S.Set=\left\{\pm\frac{5}{4}\right\}$$

Homework

Ex 1.3 Remaining parts