

## Exercise 1.2

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**Q. 1: Solve the following equations using quadratic formula.**

(i)  $2 - x^2 = 7x$

$$-x^2 - 7x + 2 = 0$$

$$a = -1, b = -7, c = 2$$

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

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(-1)(2)}}{2(-1)}$$

$$x = \frac{7 \pm \sqrt{49+8}}{-2}$$

$$x = \frac{7 \pm \sqrt{57}}{-2}$$

$$\text{S.S} = \left\{ \frac{7 \pm \sqrt{57}}{-2} \right\}$$

(ii)  $5x^2 + 8x + 1 = 0$

$$a = 5, b = 8, c = 1$$

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

$$x = \frac{-(8) \pm \sqrt{(8)^2 - 4(5)(1)}}{2(5)}$$

$$x = \frac{-8 \pm \sqrt{64-20}}{10}$$

$$x = \frac{-8 \pm \sqrt{44}}{10}$$

$$x = \frac{-8 \pm \sqrt{4 \times 11}}{10}$$

$$x = \frac{-8 \pm 2\sqrt{11}}{10}$$

$$x = \frac{2(-4 \pm \sqrt{11})}{10}$$

$$x = \frac{-4 \pm \sqrt{11}}{5}$$

$$\text{S.S} = \left\{ \frac{-4 \pm \sqrt{11}}{5} \right\}$$

(iii)  $\sqrt{3}x^2 + x = 4\sqrt{3}$

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

$$a = \sqrt{3}, b = 1, c = -4\sqrt{3}$$

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

$$x = \frac{-(1) \pm \sqrt{(1)^2 - 4(\sqrt{3})(-4\sqrt{3})}}{2(\sqrt{3})}$$

$$x = \frac{-1 \pm \sqrt{1+16(\sqrt{3})^2}}{2\sqrt{3}}$$

$$x = \frac{-1 \pm \sqrt{1+16(3)}}{2\sqrt{3}}$$

$$x = \frac{-1 \pm \sqrt{1+48}}{2\sqrt{3}}$$

$$x = \frac{-1 \pm \sqrt{49}}{2\sqrt{3}}$$

$$x = \frac{-1 \pm 7}{2\sqrt{3}}$$

$$x = \frac{-1+7}{2\sqrt{3}} \quad \text{and}$$

$$x = \frac{-1-7}{2\sqrt{3}}$$

$$x = \frac{6}{2\sqrt{3}} \quad \text{and}$$

$$x = \frac{-8}{2\sqrt{3}}$$

$$x = \frac{3}{\sqrt{3}} \quad \text{and}$$

$$x = \frac{-4}{\sqrt{3}}$$

$$x = \frac{3}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \quad \text{and}$$

$$x = \frac{-4}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$x = \frac{3\sqrt{3}}{(\sqrt{3})^2} \quad \text{and}$$

$$x = \frac{-4\sqrt{3}}{(\sqrt{3})^2}$$

$$x = \frac{3\sqrt{3}}{3} \quad \text{and}$$

$$x = \frac{-4\sqrt{3}}{3}$$

$$x = \sqrt{3} \quad \text{and}$$

$$x = \frac{-4\sqrt{3}}{3}$$

$$\text{S.S} = \left\{ \sqrt{3}, \frac{-4\sqrt{3}}{3} \right\}$$

$$(iv) \quad 4x^2 - 14 = 3x$$

$$4x^2 - 3x - 14 = 0$$

$$a = 4, \quad b = -3, \quad c = -14$$

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

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(-14)}}{2(4)}$$

$$x = \frac{3 \pm \sqrt{9+224}}{8}$$

$$x = \frac{3 \pm \sqrt{233}}{8}$$

$$\text{S.S} = \left\{ \frac{3 \pm \sqrt{233}}{8} \right\}$$

$$(v) \quad 6x^2 - 3 - 7x = 0$$

$$6x^2 - 7x - 3 = 0$$

$$a = 6, \quad b = -7, \quad c = -3$$

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

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(6)(-3)}}{2(6)}$$

$$x = \frac{7 \pm \sqrt{49+72}}{12}$$

$$x = \frac{7 \pm \sqrt{121}}{12}$$

$$x = \frac{7 \pm 11}{12}$$

$$x = \frac{7+11}{12} \quad \text{and}$$

$$x = \frac{7-11}{12}$$

$$x = \frac{18}{12} \quad \text{and}$$

$$x = \frac{-4}{12}$$

$$x = \frac{3}{2} \quad \text{and} \quad x = \frac{-1}{3}$$

$$\text{S.S} = \left\{ \frac{3}{2}, \frac{-1}{3} \right\}$$

$$(vi) \quad 3x^2 + 8x + 2 = 0$$

$$a = 3, \quad b = 8, \quad c = 2$$

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

$$x = \frac{-(8) \pm \sqrt{(8)^2 - 4(3)(2)}}{2(3)}$$

$$x = \frac{-8 \pm \sqrt{64 - 24}}{6}$$

$$x = \frac{-8 \pm \sqrt{40}}{6}$$

$$x = \frac{-8 \pm \sqrt{4 \times 10}}{6}$$

$$x = \frac{-8 \pm 2\sqrt{10}}{6}$$

$$x = \frac{2(-4 \pm \sqrt{10})}{6}$$

$$x = \frac{-4 \pm \sqrt{10}}{3}$$

$$x = \frac{-4 + \sqrt{10}}{3} \quad \text{and} \quad x = \frac{-4 - \sqrt{10}}{3}$$

$$\text{S.S} = \left\{ \frac{-4 + \sqrt{10}}{3}, \frac{-4 - \sqrt{10}}{3} \right\}$$

$$(vii) \quad \frac{3}{x-6} - \frac{4}{x-5} = 1$$

$$\frac{3(x-5) - 4(x-6)}{(x-6)(x-5)} = 1$$

$$\frac{3x - 15 - 4x + 24}{x^2 - 6x - 5x + 30} = 1$$

$$\frac{-x + 9}{x^2 - 11x + 30} = 1$$

$$-x + 9 = x^2 - 11x + 30$$

$$0 = x^2 - 11x + 30 + x - 9$$

$$0 = x^2 - 10x + 21$$

$$a = 1, \quad b = -10, \quad c = 21$$

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(21)}}{2(1)}$$

$$x = \frac{10 \pm \sqrt{100 - 84}}{2}$$

$$x = \frac{10 \pm \sqrt{16}}{2}$$

$$x = \frac{10 \pm 4}{2}$$

$$x = \frac{10+4}{2} \quad \text{and} \quad x = \frac{10-4}{2}$$

$$x = \frac{14}{2} \quad \text{and} \quad x = \frac{6}{2}$$

$$S.S = \{7, 3\}$$

(viii)

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

$$\frac{2x(x+2) - (4-x)(x-1)}{2x(x-1)} = \frac{7}{3}$$

$$\frac{(2x^2+4x) - (4x-4-x^2+x)}{2x^2-2x} = \frac{7}{3}$$

$$\frac{(2x^2+4x) - (5x-4-x^2)}{2x^2-2x} = \frac{7}{3}$$

$$\frac{2x^2+4x-5x+4+x^2}{2x^2-2x} = \frac{7}{3}$$

$$\frac{3x^2-x+4}{2x^2-2x} = \frac{7}{3}$$

$$3(3x^2 - x + 4) = 7(2x^2 - 2x)$$

$$9x^2 - 3x + 12 = 14x^2 - 14x$$

$$9x^2 - 3x + 12 - 14x^2 + 14x = 0$$

$$-5x^2 + 11x + 12 = 0$$

$$a = -5,$$

$$b = 11,$$

$$c = 12$$

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

$$x = \frac{-(11) \pm \sqrt{(11)^2 - 4(-5)(12)}}{2(-5)}$$

$$x = \frac{-11 \pm \sqrt{121 + 240}}{-10}$$

$$x = \frac{-11 \pm \sqrt{361}}{-10}$$

$$x = \frac{-11 \pm 19}{-10}$$

$$x = \frac{-11+19}{-10}$$

and

$$x = \frac{-11-19}{-10}$$

$$x = \frac{8}{-10}$$

and

$$x = \frac{-30}{-10}$$

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

and

$$x = 3$$

$$S.S = \left\{\frac{-4}{5}, 3\right\}$$

(ix)

$$\frac{a}{x-b} + \frac{b}{x-a} = 2$$

$$\frac{a(x-a) + b(x-b)}{(x-a)(x-b)} = 2$$

$$\frac{ax - a^2 + bx - b^2}{x^2 - bx - ax + ab} = 2$$

$$\frac{ax + bx - a^2 - b^2}{x^2 - ax - bx + ab} = 2$$

$$ax + bx - a^2 - b^2 = 2(x^2 - ax - bx + ab)$$

$$ax + bx - a^2 - b^2 = 2x^2 - 2ax - 2bx + 2ab$$

$$0 = 2x^2 - 2ax - 2bx + 2ab - ax - bx + a^2 + b^2$$

$$0 = 2x^2 - 3ax - 3bx + 2ab + a^2 + b^2$$

$$0 = 2x^2 - 3(a+b)x + 2ab + a^2 + b^2$$

$$a = 2, \quad b = -3(a + b), \quad c = a^2 + b^2 + 2ab$$

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

$$x = \frac{-(-3(a+b)) \pm \sqrt{(-3(a+b))^2 - 4(2)(a^2 + b^2 + 2ab)}}{2(2)}$$

$$x = \frac{3a+3b \pm \sqrt{9(a+b)^2 - 8(a+b)^2}}{4}$$

$$x = \frac{3a+3b \pm \sqrt{(a+b)^2}}{4}$$

$$x = \frac{3a+3b \pm (a+b)}{4}$$

$$x = \frac{3a+3b+(a+b)}{4}$$

and

$$x = \frac{3a+3b-(a+b)}{4}$$

$$x = \frac{3a+3b+a+b}{4}$$

and

$$x = \frac{3a+3b-a-b}{4}$$

$$x = \frac{4a+4b}{4}$$

and

$$x = \frac{2a+2b}{4}$$

$$x = \frac{4(a+b)}{4}$$

and

$$x = \frac{2(a+b)}{4}$$

$$x = a + b$$

and

$$x = \frac{a+b}{2}$$

$$S.S = \left\{ a + b, \frac{a+b}{2} \right\}$$

$$(x) \quad -(l+m) - lx^2 + (2l+m)x = 0$$

$$-lx^2 + (2l+m)x - (l+m) = 0$$

$$a = -l, \quad b = (2l+m), \quad c = -(l+m)$$

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

$$x = \frac{-(2l+m) \pm \sqrt{(2l+m)^2 - 4(-l)(-(l+m))}}{2(-l)}$$

$$x = \frac{-(2l+m) \pm \sqrt{4l^2 + m^2 + 4lm - 4l^2 - 4lm}}{-2l}$$

$$x = \frac{-(2l+m) \pm \sqrt{m^2}}{-2l}$$

$$x = \frac{-(2l+m) \pm m}{-2l}$$

$$x = \frac{-2l-m+m}{-2l}$$

and

$$x = \frac{-2l-m-m}{-2l}$$

$$x = \frac{-2l}{-2l}$$

and

$$x = \frac{-2l-2m}{-2l}$$

$$x = 1$$

and

$$x = \frac{-2(l+m)}{-2l}$$

$$S.S = \left\{ 1, \frac{l+m}{l} \right\}$$