

**Exercise 7.1****1. Solve the following equations**

(i)  $\frac{2}{3}x - \frac{1}{2}x = x + \frac{1}{6}$

As L.C.M of 3, 2, 6 is 6, so multiplying by 6.

$$6\left(\frac{2}{3}x\right) - 6\left(\frac{1}{2}x\right) = 6x + 6\left(\frac{1}{6}\right)$$

$$2(2x) - 3(x) = 6x + 1$$

$$4x - 3x = 6x + 1$$

$$x = 6x + 1$$

$$x - 6x = 1$$

$$-5x = 1$$

$$x = -\frac{1}{5}$$

(ii)  $\frac{x-3}{3} - \frac{x-2}{2} = -1$

As L.C.M of 3, 2 is 6, so multiplying by 6.

$$6\left(\frac{x-3}{3}\right) - 6\left(\frac{x-2}{2}\right) = 6(-1)$$

$$2(x-3) - 3(x-2) = -6$$

$$2x - 6 - 3x + 6 = -6$$

$$-x = -6$$

$$x = 6$$

(iii)  $\frac{1}{2}\left(x - \frac{1}{6}\right) + \frac{2}{3} = \frac{5}{6} + \frac{1}{3}\left(\frac{1}{2} - 3x\right)$

$$\frac{x}{2} - \frac{1}{12} + \frac{2}{3} = \frac{5}{6} + \frac{1}{6} - \frac{3x}{3}$$

As L.C.M of 2, 12, 3, 6 is 12, so multiplying by 12.

$$12\left(\frac{x}{2}\right) - 12\left(\frac{1}{12}\right) + 12\left(\frac{2}{3}\right) = 12\left(\frac{5}{6}\right) + 12\left(\frac{1}{6}\right) - 12\left(\frac{3x}{3}\right)$$

$$6x - 1 + 8 = 10 + 2 - 12x$$

$$6x + 7 = 12 - 12x$$

$$6x + 12x = 12 - 7$$

$$18x = 5$$

$$x = \frac{5}{18}$$

(iv)  $x + \frac{1}{3} = 2\left(x - \frac{2}{3}\right) - 6x$

$$x + \frac{1}{3} = 2x - \frac{4}{3} - 6x$$

multiplying by 3

$$3x + 1 = 6x - 4 - 18x$$

$$3x + 1 = -4 - 12x$$

$$3x + 1 = -4 - 12x$$

$$3x + 12x = -4 - 1$$

$$15x = -5$$

$$x = \frac{-5}{15}$$



$$x = \frac{-1}{3}$$

$$(v) \quad \frac{5(x-3)}{6} - x = 1 - \frac{x}{9}$$

multiplying by 18

$$18 \left( \frac{5(x-3)}{6} \right) - 18x = 18 - 18 \left( \frac{x}{9} \right)$$

$$15(x-3) - 18x = 18 - 2x$$

$$15x - 45 - 18x = 18 - 2x$$

$$-3x - 45 = 18 - 2x$$

$$-3x + 2x = 18 + 45$$

$$-x = 63$$

$$x = -63$$

$$(vi) \quad \frac{x}{3x-6} = 2 - \frac{2x}{x-2}$$

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

multiplying by  $3(x-2)$

$$\frac{3x(x-2)}{3(x-2)} = 6(x-2) - \frac{6x(x-2)}{x-2}$$

$$x = 6(x-2) - 6x$$

$$x = 6x - 12 - 6x$$

$$x = -12$$

$$(vii) \quad \frac{2x}{2x+5} = \frac{2}{3} - \frac{5}{4x+10}$$

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

multiplying by  $6(2x+5)$

$$\frac{12x(2x+5)}{2x+5} = \frac{12(2x+5)}{3} - \frac{30(2x+5)}{2(2x+5)}$$

$$12x = 4(2x+5) - 15$$

$$12x = 8x + 20 - 15$$

$$12x - 8x = 5$$

$$4x = 5$$

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

$$(viii) \quad \frac{2x}{x-1} + \frac{1}{3} = \frac{5}{6} + \frac{2}{x-1}$$

multiplying by  $6(x-1)$

$$\frac{12x(x-1)}{x-1} + \frac{6(x-1)}{3} = \frac{30(x-1)}{6} + \frac{12(x-1)}{x-1}$$

$$12x + 2(x-1) = 5(x-1) + 12$$

$$12x + 2x - 2 = 5x - 5 + 12$$

$$14x - 2 = 5x + 7$$

$$14x - 5x = 7 + 2$$

$$9x = 9$$

$$x = 1$$

$$(ix) \quad \frac{2}{x^2-1} - \frac{1}{x+1} = \frac{1}{x+1}$$

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

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

multiplying by  $(x-1)(x+1)$

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

$$2 = 2(x-1)$$

$$2 = 2x - 2$$

$$-2x = -2 - 2$$

$$-2x = -4$$

$$x = 2$$

$$(x) \quad \frac{2}{3x+6} = \frac{1}{6} - \frac{1}{2x+4}$$

$$\frac{2}{3(x+2)} = \frac{1}{6} - \frac{1}{2(x+2)}$$

multiplying by  $6(x+2)$

$$\frac{12(x+2)}{3(x+2)} = \frac{6(x+2)}{6} - \frac{6(x+2)}{2(x+2)}$$

$$4 = x + 2 - 3$$

$$4 = x - 1$$

$$x = 5$$

**Q. 2: Solve each equation and check for extraneous solution, if any.**

$$(i) \quad \sqrt{3x+4} = 2$$

squaring both sides

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

$$3x + 4 = 4$$

$$3x = 0$$

$$x = 0$$

Checking at  $x = 0$

$$\sqrt{3(0)+4} = 2$$

$$\sqrt{4} = 2$$

$$2 = 2$$

So, S.S = {0}

$$(ii) \quad \sqrt[3]{2x-4} - 2 = 0$$

$$\sqrt[3]{2x-4} = 2$$

squaring both sides

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

$$2x - 4 = 8$$

$$2x = 12$$

$$x = 6$$

Checking at  $x = 6$

$$\sqrt[3]{2(6) - 4} - 2 = 0$$

$$\sqrt[3]{12 - 4} - 2 = 0$$

$$\sqrt[3]{8} - 2 = 0$$

$$2 - 2 = 0$$

So, S.S = {6}

$$(iii) \quad \sqrt{x - 3} - 7 = 0$$

$$\sqrt{x - 3} = 7$$

squaring both sides

$$(\sqrt{x - 3})^2 = (7)^2$$

$$x - 3 = 49$$

$$x = 52$$

Checking at  $x = 52$

$$\sqrt{52 - 3} - 7 = 0$$

$$\sqrt{49} - 7 = 0$$

$$7 - 7 = 0$$

So, S.S = {52}

$$(iv) \quad 2\sqrt{t + 4} = 5$$

squaring both sides

$$(2\sqrt{t + 4})^2 = (5)^2$$

$$4(t + 4) = 25$$

$$4t + 16 = 25$$

$$4t = 9$$

$$t = \frac{9}{4}$$

Checking at  $t = \frac{9}{4}$

$$2\sqrt{\frac{9}{4} + 4} = 5$$

$$2\sqrt{\frac{9+16}{4}} = 5$$

$$2\sqrt{\frac{25}{4}} = 5$$

$$2\left(\frac{5}{2}\right) = 5$$

$$5 = 5$$

So, S.S =  $\left\{\frac{9}{4}\right\}$

$$(v) \quad \sqrt[3]{2x + 3} = \sqrt[3]{x - 2}$$

squaring both sides

$$(\sqrt[3]{2x + 3})^3 = (\sqrt[3]{x - 2})^3$$

$$2x + 3 = x - 2$$

$$x = -5$$



Checking at  $x = -5$

$$\sqrt[3]{2(-5) + 3} = \sqrt[3]{-5 - 2}$$

$$\sqrt[3]{-10 + 3} = \sqrt[3]{-7}$$

$$\sqrt[3]{-7} = \sqrt[3]{-7}$$

So, S.S =  $\{-5\}$

$$(vi) \quad \sqrt[3]{2-t} = \sqrt[3]{2t-28}$$

squaring both sides

$$(\sqrt[3]{2-t})^3 = (\sqrt[3]{2t-28})^3$$

$$2-t = 2t-28$$

$$-t-2t = -28-2$$

$$-3t = -30$$

$$t = 10$$

Checking at  $t = 10$

$$\sqrt[3]{2-10} = \sqrt[3]{20-28}$$

$$\sqrt[3]{-8} = \sqrt[3]{-8}$$

So, S.S =  $\{10\}$

$$(vii) \quad \sqrt{2t+6} - \sqrt{2t-5} = 0$$

$$\sqrt{2t+6} = \sqrt{2t-5}$$

squaring both sides

$$(\sqrt{2t+6})^2 = (\sqrt{2t-5})^2$$

$$2t+6 = 2t-5$$

$$2t-2t = -5-6$$

$$0 = -11$$

S.S =  $\{ \}$

$$(viii) \quad \sqrt{\frac{x+1}{2x+5}} = 2$$

squaring both sides

$$\left(\sqrt{\frac{x+1}{2x+5}}\right)^2 = (2)^2$$

$$\frac{x+1}{2x+5} = 4$$

$$x+1 = 4(2x+5)$$

$$x+1 = 8x+20$$

$$x-8x = 20-1$$

$$-7x = 19$$

$$x = -\frac{19}{7}$$

Checking at  $x = -\frac{19}{7}$

$$\sqrt{\frac{-\frac{19}{7}+1}{2(-\frac{19}{7})+5}} = 2$$

$$\sqrt{\frac{-\frac{19}{7}+1}{-\frac{38}{7}+5}} = 2$$

$$\sqrt{\frac{\frac{-19+7}{7}}{\frac{-38+35}{7}}} = 2$$

$$\sqrt{\frac{\frac{-12}{7}}{\frac{-3}{7}}} = 2$$

$$\sqrt{\frac{-12}{-3}} = 2$$

$$\sqrt{4} = 2$$

$$\text{So, S.S} = \left\{-\frac{19}{7}\right\}$$

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