



Solve:

Q.1. (i) $3x + 20 = 44$

Sol. $3x = 44 - 20$

$$3x = 24$$

$$\frac{3x}{3} = \frac{24}{3}$$
 (Dividing by 3)

$$x = 8$$

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

Sol. Multiplied by 4, 5 L.C.M. 20.

$$\frac{4x}{5}(20) - \frac{3x}{4}(20) = 4(20)$$

$$16x - 15x = 80$$

$$x = 80$$

(iii) $3x + 3(x + 1) = 69$

Sol. $3x + 3x + 3 = 69$

$$6x + 3 = 69$$

$$6x = 69 - 3$$

$$6x = 66$$

$$\frac{6x}{6} = \frac{66}{6}$$
 (Dividing by 6)

$$x = 11$$

(iv) $(90 - 9x) + 27 = 90 + 9$

Sol. $90 - 9x + 27 = 99$

$$- 9x = 99 - 90 - 27$$

$$- 9x = - 18$$

$$\frac{-9x}{-9} = \frac{-18}{-9} \text{ (Dividing by -9)}$$

$$x = 2$$

Q.2. $3(x + 3) = 14 + x$

Sol. $3x + 9 = 14 + x$

$$3x - x = 14 - 9$$

$$2x = 5$$

$$\frac{2x}{2} = \frac{5}{2} \text{ (Dividing by 2)}$$

$$x = \frac{5}{2}$$

Q.3. $3(2x + 5) = 25 + x$

Sol. $6x + 15 = 25 + x$

$$6x - x = 25 - 15$$

$$5x = 10$$

$$\frac{5x}{5} = \frac{10}{5} \text{ (Dividing by 5)}$$

$$x = 2$$

Q.4. $9x - 3 = 3(2x - 8)$

Sol. $9x - 3 = 6x - 24$

$$9x - 6x = - 24 + 3$$

$$3x = -21$$

$$\frac{3x}{3} = \frac{-21}{3} \text{ (Dividing by 3)}$$

$$x = -7$$

Q.5. $3(2x - 1) = 5(x - 1)$

Sol. $6x - 3 = 5x - 5$

$$6x - 5x = -5 + 3 \text{ (By Transposing)}$$

$$x = -2$$

Q.6. $2(7x - 6) = 3(1 + 3x)$

Sol. $14x - 12 = 3 + 9x$

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

$$5x = 15$$

$$\frac{x}{5} = \frac{15}{5} \text{ (Dividing by 5)}$$

$$x = 3$$

Q.7. $\frac{10x - 1}{2x + 5} = 3$

Sol. $10x - 1 = 3(2x + 5)$

$$10x - 1 = 6x + 15$$

$$10x - 6x = 15 + 1$$

$$4x = 16$$

$$\frac{x}{4} = \frac{16}{4} \text{ (Dividing by 4)}$$

$$x = 4$$

Q.8. $\frac{2x+1}{x+5} = 1$

Sol. $2x + 1 = 1(x + 5)$

$$2x + 1 = x + 5$$

$$2x - x = 5 - 1$$

$$x = 4$$

Q.9. $\frac{5x+3}{x+6} = 2$

Sol. $5x + 3 = 2(x + 6)$

$$5x + 3 = 2x + 12$$

$$5x - 2x = 12 - 3$$

$$3x = 9$$

$$\frac{x}{3} = \frac{9}{3} \quad (\text{Dividing by 3})$$

$$x = 3$$

Q.10. $y - 6 + \sqrt{y} = 0$

Sol. $\sqrt{y} = 6 - y$

$$(\sqrt{y})^2 = (6 - y)^2 \quad (\text{Squaring on both sides})$$

$$y = 36 + y^2 - 12y$$

$$0 = 36 + y^2 - 12y - y$$

$$0 = 36 + y^2 - 13y$$

$$\Rightarrow y^2 - 13y + 36 = 0$$

$$y^2 - 4y - 9y + 36 = 0$$

$$y(y - 4) - 9(y - 4) = 0$$

$$(y - 4)(y - 9) = 0$$

If $y - 4 = 0$

Then, $y = 4$

and if $y - 9 = 0$

$$\text{Then, } y = 9$$

Check to eliminate extraneous root $y = 9$.

Q.11

$$x = 15 - 2\sqrt{x}$$

Sol.

$$2\sqrt{x} = 15 - x$$

$$(2\sqrt{x})^2 = (15 - x)^2 \text{ (Squaring on both sides)}$$

$$4x = 225 + x^2 - 30x$$

$$0 = 225 + x^2 - 30x - 4x$$

$$0 = x^2 + 225 - 34x$$

$$\Rightarrow x^2 - 34x + 225 = 0$$

$$x^2 - 9x - 25x + 225 = 0$$

$$x(x - 9) - 25(x - 9) = 0$$

$$(x - 9)(x - 25) = 0$$

$$\text{If } x - 9 = 0$$

$$\text{then } x = 9$$

$$\text{And if } x - 25 = 0$$

$$\text{then } x = 25$$

Check to eliminate extraneous roots $x = 25$

Q.12.

$$m - 13 = \sqrt{m + 7}$$

Sol.

$$(m - 13)^2 = (\sqrt{m + 7})^2 \text{ Squaring both sides}$$

$$m^2 - 26m + 169 = m + 7$$

$$m^2 - 26m + 169 - m - 7 = 0$$

$$m^2 - 27m + 162 = 0$$

$$m^2 - 18m - 9m + 162 = 0$$

$$m(m - 18) - 9(m - 18) = 0$$

$$(m - 18)(m - 9) = 0$$

If $m - 18 = 0$

then $m = 18$

If any $m - 9 = 0$

Then $m = 9$

Check to eliminate extraneous roots $m = 9$

Q.13 $\sqrt{5n+9} = n - 1$

Sol. $(\sqrt{5n+9})^2 = (n-1)^2$ (Squaring both sides)

$$5n + 9 = n^2 - 2n + 1$$

$$0 = n^2 - 2n + 1 - 5n - 9$$

$$0 = n^2 - 7n - 8$$

$$\Rightarrow n^2 - 7n - 8 = 0$$

$$n^2 - 8n + n - 8 = 0$$

$$n(n - 8) + 1(n - 8) = 0$$

$$(n - 8)(n + 1) = 0$$

If $n - 8 = 0$

Then $n = 8$

If any $n + 1 = 0$

then $n = -1$

Check to eliminate extraneous roots $n = -1$

Q.14. $3 + \sqrt{2x-1} = 0$

Sol. $\sqrt{2x-1} = 0 - 3$

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

Square root is always positive.

Therefore = { } S.S.

Let solve

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

$$(\sqrt{2x-1})^2 = (-3)^2 \text{ (Squaring both sides)}$$

$$2x-1 = 9$$

$$2x = 9 + 1$$

$$2x = 10$$

$$\frac{x}{2} = \frac{10}{2} \text{ (Dividing by 2)}$$

$$x = 5$$

$$\text{L.H.S.} = \sqrt{2x-1} \text{ To check}$$

$$= \sqrt{2 \times 5 - 1} \quad (\text{Putting } x = 5)$$

$$= \sqrt{10 - 1}$$

$$= \sqrt{9}$$

$$= 3$$

Square root is always positive.

Hence, S.S. = { }

Q.15 $\sqrt{x+5} + 7 = 0$

Sol. $\sqrt{x+5} = 0 - 7$

$$\sqrt{x+5} = -7$$

Square root is always taken positive.

Hence, S.S. = { }

Q.16. $\sqrt{2x-1} - \sqrt{x-4} = 2$

Sol. $\sqrt{2x-1} = 2 + \sqrt{x-4}$

Squaring root on both sides

$$\left(\sqrt{2x-1}\right)^2 = \left(2 + \sqrt{x-4}\right)^2$$

$$2x-1 = 4+x-4+4\sqrt{x-4}$$

$$2x-1-x = 4\sqrt{x-4}$$

$$x-1 = 4\sqrt{x-4}$$

(Again squaring) $(x-1)^2 = (4\sqrt{x-4})^2$

$$x^2 - 2x + 1 = 16(x-4)$$

$$x^2 - 2x + 1 = 16x - 64$$

$$x^2 - 2x - 16x + 1 + 64 = 0$$

$$x^2 - 18x + 65 = 0$$

$$x^2 - 13x - 5x + 65 = 0$$

$$x(x-13) - 5(x-13) = 0$$

$$(x-13)(x-5) = 0$$

If $x-13=0$

Then $x=13$

If any $x-5=0$

then $x=5$

$$\text{S.S.} = \{13, 5\}$$

Q.17. $\sqrt{x+1} = 3$

Sol. $\left(\sqrt{x+1}\right)^2 = (3)^2$ (Squaring both sides)

$$x+1 = 9$$

$$x = 9 - 1$$

$$x = 8$$

Q.18. $\sqrt{2x-1} = 5$

Sol. $(\sqrt{2x-1})^2 = (5)^2$ (Squaring both sides)

$$2x - 1 = 25$$

$$2x = 25 + 1$$

$$2x = 26$$

$$x = \frac{26}{2}$$

$$x = 13$$

Q.19. $\sqrt{x-1} = 10$

Sol. $(\sqrt{x-1})^2 = (10)^2$ (Squaring both sides)

$$x - 1 = 100$$

$$x = 100 + 1$$

$$x = 101$$

Q.20. $\sqrt{3x+4} = 7$

Sol. $(\sqrt{3x+4})^2 = (7)^2$ (Squaring both sides)

$$3x + 4 = 49$$

$$3x = 49 - 4$$

$$3x = 45$$

$$x = \frac{45}{3}$$

$$x = 15$$