RD SHARMA

Solutions

Class 8 Maths

Chapter 9

Ex 9.3

Solve each of the following equations and also verify your solutions:

Q1 $\frac{2x-3}{3x+2} = -\frac{2}{3}$

Sol:

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

$\Rightarrow 6x - 9 = -6x - 4$

$\Rightarrow 6x + 6x = 9 - 4$

$\Rightarrow \quad 12x = 5$

$\Rightarrow \quad x = \frac{5}{12}$

Verification

L.H.S $= \frac{2(\frac{5}{12})-3}{3(\frac{5}{12})+2}$

$= \frac{\frac{5}{6}-3}{\frac{5}{4}+2}$

$= \frac{\frac{-13}{6})}{\frac{13}{4}}$

$= \frac{-4}{6}$

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

R.H.S $= \frac{-2}{3}$

Hence, L.H.S = R.H.S

Q2. $\frac{2-y}{y+7} = \frac{3}{5}$

Sol:

$\frac{2-y}{y+7} = \frac{3}{5}$

$\Rightarrow 10 - 5y = 3y + 21$

$\Rightarrow 3y + 5y = 10 - 21$

$\Rightarrow \quad 8y = -11$

$\Rightarrow \quad y = \frac{-11}{8}$

Verification

L.H.S $= \frac{2-(\frac{-11}{8})}{(\frac{-11}{8})+7}$

$= \frac{16+11}{-11+56}$

$= \frac{27}{45}$

$= \frac{3}{5}$

R.H.S $= \frac{3}{5}$

Hence, L.H.S = R.H.S

Q3 $\frac{5x-7}{3x} = 2$

Sol:

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

$\Rightarrow 6x = 5x - 7$

$\Rightarrow 6x - 5x = 7$

$\Rightarrow \quad x = -7$

Verification

L.H.S $= \frac{5(-7)-7}{3(-7)}$

$= \frac{-35-7}{-21}$

$= \frac{-42}{-21}$

$= 2$

R.H.S $= 2$

Hence, L.H.S = R.H.S

Q4 $\frac{3x+5}{2x+7} = 4$

Sol:

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

$\Rightarrow 3x + 5 = 8x + 28$

$\Rightarrow 8x - 3x = 5 - 28$

$\Rightarrow 5x = -23$

$\Rightarrow \quad x = \frac{-23}{5}$

Verification

L.H.S $= \frac{3(\frac{-23}{5})+5}{2(\frac{-23}{5})+7}$

$= \frac{-69+25}{-46+35}$

$= \frac{-44}{-11}$

$= 4$

R.H.S $= 4$

Hence, L.H.S = R.H.S

Q5 $\frac{2y+5}{y+4} = 1$

Sol:

$\frac{2y+5}{y+4}$

$\Rightarrow 2y + 5 = y + 4$

$\Rightarrow 2y - y = 4 - 5$

$\Rightarrow y = -1$

Verification

L.H.S $= \frac{2(-1)+5}{(-1)+4}$

$= \frac{-2+5}{3}$

$= \frac{3}{3}$

$= 1$

R.H.S $= 1$

Hence, L.H.S = R.H.S

Q6 $\frac{2x+1}{3x-2} = \frac{5}{9}$

Sol:

$\frac{2x+1}{3x-2} = \frac{5}{9}$

$\Rightarrow 18x + 9 = 15x - 10$

$\Rightarrow 18x - 15x = -10 - 9$

$\Rightarrow \quad 3x = -19$

$\Rightarrow \quad x = \frac{-19}{3}$

Verification

L.H.S = $\frac{2(\frac{-19}{3})+1}{3(\frac{-19}{3})-2}$

$= \frac{-38+3}{-57-6}$

$= \frac{-35}{-63}$

$= \frac{5}{9}$

R.H.S = $\frac{5}{9}$

Hence, L.H.S = R.H.S

Q7 $\frac{1-9y}{19-3y} = \frac{5}{8}$

Sol:

$\frac{1-9y}{19-3y} = \frac{5}{8}$

$\Rightarrow 8 - 72y = 95 - 15y$

$\Rightarrow 72y - 15y = 8 - 95$

$\Rightarrow \quad 57y = -87$

$\Rightarrow \quad y = \frac{-87}{57}$

$\Rightarrow \quad y = \frac{-29}{19}$

Verification

L.H.S = $\frac{1-9(\frac{-29}{19})}{19-3(\frac{-29}{19})}$

$= \frac{19+261}{361+87}$

$= \frac{280}{448}$

$= \frac{5}{8}$

R.H.S = $\frac{5}{8}$

Hence, L.H.S = R.H.S

Q8 $\frac{2x}{3x+1} = -3$

Sol:

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

=> 2x = -9x – 3

=> 2x + 9x = -3

=> 11x = -3

=> $x = \frac{-3}{11}$

Verification

L.H.S = $\frac{2(\frac{-3}{11})}{3(\frac{-3}{11})+1}$

= $\frac{-6}{-9+11}$

= $\frac{-6}{2}$

= -3

R.H.S = -3

Hence, L.H.S = R.H.S

Q9 $\frac{y-(7-8y)}{9y-(3+4y)} = \frac{2}{3}$

Sol:

$\frac{y-(7-8y)}{9y-(3+4y)} = \frac{2}{3}$

=> $\frac{9y-7}{5y-3} = \frac{2}{3}$

=> 27y – 21 = 10y – 6

=> 27y – 10y = 21 – 6

=> 17y = 15

=> $y = \frac{15}{17}$

Verification

L.H.S = $\frac{9(\frac{15}{17})-7}{5(\frac{15}{17})-3}$

= $\frac{135-119}{75-51}$

= $\frac{16}{24}$

= $\frac{2}{3}$

R.H.S = $\frac{2}{3}$

Hence, L.H.S = R.H.S

Q10 $\frac{6}{2x-3(3-4x)} = \frac{2}{3}$

Sol:

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

=> $\frac{6}{6x-3} = \frac{2}{3}$

=> 12x – 6 = 18

=> 12x = 18 + 6

=> 12x = 24

=> $x = \frac{24}{12}$

=> x = 2

Verification

L.H.S = $\frac{6}{2(2)-3(3-4(2))}$

= $\frac{6}{9}$

= $\frac{2}{3}$

R.H.S = $\frac{2}{3}$

Hence, L.H.S = R.H.S

Q11 $\frac{3}{2x} - \frac{3}{2x} = \frac{1}{12}$

Sol:

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

=> $\frac{4-9}{6x} = \frac{1}{12}$

=> $\frac{-5}{x} = \frac{1}{2}$

=> x = -10

Verification

L.H. S = $\frac{3}{2(-10)} - \frac{3}{2(10)}$

= $\frac{2}{-30} - \frac{3}{-30}$

= $\frac{4-9}{-60}$

= $\frac{-5}{-60}$

= $\frac{1}{12}$

R.H.S = $\frac{1}{12}$

Hence, L.H.S = R.H.S

Q12 $\frac{3x+5}{4x+2} = \frac{3x+4}{4x+7}$

Sol:

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

=> $12x^2 + 20x + 21x + 35 = 12x^2 + 16x + 6x + 8$

=> $12x^2 - 12x^2 + 41x - 22x = 8 - 35$

=> 19x = -27

=> x = $\frac{-27}{19}$

Verification

L.H.S = $\frac{3(\frac{-27}{19})+5}{4(\frac{-27}{19})+2}$

= $\frac{-81+95}{-108+38}$

= $\frac{14}{-70}$

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

R.H.S = $\frac{3(\frac{-27}{19})+4}{4(\frac{-27}{19})+7}$

$= \frac{-81+76}{-108+133}$

$= \frac{-5}{25}$

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

Hence, L.H.S = R.H.S

Q13 $\frac{7x-2}{5x-1} = \frac{7x+}{5x+4}$

Sol:

$\frac{7x-2}{5x-1} = \frac{7x+}{5x+4}$

$\Rightarrow 35x^2 + 28x - 10x - 8 = 35x^2 + 15x - 7x - 3$

$\Rightarrow 35x^2 - 35x^2 + 18x - 8x = 8 - 3$

$\Rightarrow 10x = 5$

$\Rightarrow \quad x = \frac{5}{10}$

$= \frac{1}{2}$

Verification

L.H.S $= \frac{7(\frac{1}{2})-2}{5(\frac{1}{2})-1}$

$= \frac{7-4}{5-2}$

$= \frac{3}{3}$

$= 1$

R.H.S $= \frac{7(\frac{1}{2})+3}{5(\frac{1}{2})+4}$

$= \frac{7+6}{5+8}$

$= \frac{3}{3}$

$= 1$

Hence, L.H.S= R.H.S

Q14 $(\frac{x+1}{x+2})^2 = \frac{x+2}{x+4}$

Sol:

$(\frac{x+1}{x+2})^2 = \frac{x+2}{x+4}$

$\Rightarrow \frac{x^2+2x+1}{x^2+4x+4} = \frac{x+2}{x+4}$

$\Rightarrow x^3 + 2x^2 + x + 4x^2 + 8x + 4 = x^3 + 4x^2 + 4x + 2x^2 + 8x + 8$

$\Rightarrow x^3 - x^3 + 6x^2 - 6x^2 + 9x - 12x = 8 - 4$

$\Rightarrow -3x = 4$

$\Rightarrow \quad x = \frac{-4}{3}$

Verification

L.H.S $= (\frac{\frac{-4}{3}+1}{\frac{-4}{3}+2})^2$

$= (\frac{-4+3}{-4+6})^2$

$= \frac{1}{4}$

R.H.S = $\frac{\frac{-4}{3}+1}{\frac{-4}{3}+2}$

= $\frac{-4+6}{-4+12}$

= $\frac{2}{8}$

= $\frac{1}{4}$

Hence, L.H.S = R.H.S

Q15 $(\frac{x+1}{x-4})^2 = \frac{x+8}{x-2}$

Sol:

$(\frac{x+1}{x-4})^2 = \frac{x+8}{x-2}$

=> $\frac{x^2+2x+1}{x^2-8x+16} = \frac{x+8}{x-2}$

=> $x^3 + 2x^2 + x - 2x^2 - 4x - 2 = x^3 - 8x^2 + 16x + 8x^2 - 64x + 128$

=> $x^3 - x^3 - 3x + 48x = 128 + 2$

=> $45x = 130$

=> $x = \frac{130}{45}$

= $\frac{26}{9}$

Verification

L.H.S = $(\frac{\frac{26}{9}+1}{\frac{26}{9}-4})^2$

= $(\frac{26+9}{26-36})^2$

= $\frac{1225}{100}$

= $\frac{49}{4}$

R.H.S = $\frac{\frac{26}{9}+8}{\frac{26}{9}-2}$

= $\frac{26+72}{26-18}$

= $\frac{98}{8}$

= $\frac{49}{4}$

Hence, L.H.S = R.H.S

Q16 $\frac{9x-7}{3x+5} = \frac{3x-4}{x+6}$

Sol:

$\frac{9x-7}{3x+5} = \frac{3x-4}{x+6}$

=> $9x^2 - 7x + 54x - 42 = 9x^2 - 12x + 15x - 20$

=> $9x^2 - 9x^2 + 47x - 3x = -20 + 42$

=> $44x = 22$

=> $x = \frac{22}{44}$

= $\frac{1}{2}$

Verification

L.H.S = $\frac{9(\frac{1}{2})-7}{3\frac{1}{2}+5}$

$= \frac{9-14}{3+10}$

$= \frac{-5}{3}$

R.H.S $= \frac{3(\frac{1}{2})-4}{\frac{1}{2}+6}$

$= \frac{3-8}{1+12}$

$= \frac{-5}{13}$

Hence, L.H.S = R.H.S

Q17 $\frac{x+2}{x+5} = \frac{x}{x+6}$

Sol:

$\frac{x+2}{x+5} = \frac{x}{x+6}$

$\Rightarrow x^2 + 2x + 6x + 12 = x^2 + 5x$

$\Rightarrow x^2 - x^2 + 8x - 5x = -12$

$\Rightarrow \quad 3x = -12$

$\Rightarrow \qquad x = \frac{-12}{3}$

$\Rightarrow \qquad x = -4$

Verification

L.H.S $= \frac{-4+2}{-4+5}$

$= -2$

R.H.S $= \frac{-4}{-4+6}$

$= -2$

Hence, L.H.S = R.H.S

Q18 $\frac{2x-(7-5x)}{9x-(3+4x)} = \frac{7}{6}$

Sol:

$\frac{2x-(7-5x)}{9x-(3+4x)} = \frac{7}{6}$

$\Rightarrow \frac{7x-7}{5x-3} = \frac{7}{6}$

$\Rightarrow 42x - 42 = 35x - 21$

$\Rightarrow 42x - 35x = 42 - 21$

$\Rightarrow 7x = 21$

$\Rightarrow \quad x = \frac{21}{7}$

$= 3$

Verification

L.H.S $= \frac{2(3)-(7-5(3))}{9(3)-(3+4(3))}$

$= \frac{6-(7-15)}{27-(3+12)}$

$= \frac{6+8}{27-15}$

$= \frac{14}{12}$

$= \frac{7}{6}$

R.H.S $= \frac{7}{6}$

Hence, L.H.S = R.H.S

Q19 $\frac{15(2-x)-5(x+6)}{1-3x} = 10$

Sol:

$\frac{15(2-x)-5(x+6)}{1-3x} = 10$

$\Rightarrow \frac{-20x}{1-3x} = 10$

$\Rightarrow 10 - 30x = -20x$

$\Rightarrow 30x - 20x = 10$

$\Rightarrow \quad 10x = 10$

$\Rightarrow \quad x = 1$

Verification

L.H.S $= \frac{15(2-1)-5(1+6)}{1-3(1)}$

$= \frac{15-35}{-2}$

$= \frac{-20}{-2}$

$= 10$

R.H.S = 10

Hence, L.H.S = R.H.S

Q20 $\frac{x+3}{x-3} + \frac{x+2}{x-2} = 2$

Sol:

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

$\Rightarrow \frac{x+3}{x-3} = 2 - \frac{x+2}{x-2}$

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

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

$\Rightarrow x^2 - 2x + 3x - 6 = x^2 - 3x - 6x + 18$

$\Rightarrow x^2 - x^2 + x + 9x = 18 + 6$

$\Rightarrow \quad 10x = 24$

$\Rightarrow \quad x = \frac{24}{10}$

$\Rightarrow \quad x = \frac{12}{5}$

Verification

L.H.S $= \frac{\frac{12}{5}+3}{\frac{12}{5}-3} + \frac{\frac{12}{5}+2}{\frac{12}{5}-2}$

$= \frac{12+15}{12-15} + \frac{12+10}{12-10}$

$= \frac{27}{-3} + \frac{22}{2}$

$= \frac{54-66}{-6}$

$= \frac{-12}{-6}$

$= 2$

R.H.S = 2

Hence, L.H.S = R.H.S

Q21 $\frac{(x+2)(2x-3)-2x^2+6}{x-5} = 2$

Sol:

$\frac{(x+2)(2x-3)-2x^2+6}{x-5} = 2$

$\Rightarrow \frac{2x^2+x-6-2x^2+6}{x-5} = 2$

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

$\Rightarrow 2x - 10 = x$

$\Rightarrow 2x - x = 10$

$\Rightarrow \quad x = 10$

Verification

L.H.S $= \frac{(10+2)(2(10)-3)-2(10)^2+6}{10-5}$

$= \frac{12(17)-200+6}{5}$

$= \frac{10}{5}$

$= 2$

R.H.S $= 2$

Hence, L.H.S = R.H.S

Q22 $\frac{x^2-(x+1)(x+2)}{5x+1} = 6$

Sol:

$\frac{x^2-(x+1)(x+2)}{5x+1} = 6$

$\Rightarrow \frac{x^2-x^2-2x-x-2}{5x+1} = 6$

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

$\Rightarrow 30x + 6 = -3x - 2$

$\Rightarrow 30x + 3x = -2 - 6$

$\Rightarrow \quad 33x = -8$

$\Rightarrow \quad x = \frac{-8}{33}$

Verification

L.H.S $= \frac{(\frac{-8}{33})^2-(\frac{-8}{33}+1)(\frac{-8}{33}+2)}{5(\frac{-8}{33})+1}$

$= \frac{\frac{64}{1089}-\frac{25}{33}(\frac{58}{33})}{\frac{-49}{33}+1}$

$= \frac{\frac{64}{1089}-\frac{1450}{1089}}{\frac{-7}{33}}$

$= \frac{\frac{-1386}{1089}}{\frac{-7}{33}}$

$= \frac{42}{7}$

$= 0$

R.H.S $= 0$

Hence, L.H.S = R.H.S

Q23 $\frac{(2x+3)-(5x-7)}{6x+11} = \frac{-8}{3}$

Sol:

$\frac{(2x+3)-(5x-7)}{6x+11} = \frac{-8}{3}$

$\Rightarrow \frac{-3x+10}{6x+11} = \frac{-8}{3}$

$\Rightarrow -9x + 30 = -48x - 88$

$\Rightarrow 48x - 9x = -88 - 30$

$\Rightarrow \quad 39x = -118$

$\Rightarrow \qquad x = \frac{-118}{39}$

Verification

L.H.S $= \frac{-3(\frac{-118}{39})+10}{6(\frac{-118}{39})+11}$

$= \frac{354+390}{-708+429}$

$= \frac{744}{-279}$

$= \frac{-8}{3}$

R.H.S $= \frac{-8}{3}$

Hence, L.H.S = R.H.S

Q24 Find the positive value of x for which the given equations is satisfied

(i) $\frac{x^2-9}{5+x^2} = \frac{-5}{9}$

Sol:

$\frac{x^2-9}{5+x^2} = \frac{-5}{9}$

$\Rightarrow 9x^2 - 81 = -25 - 5x^2$

$\Rightarrow 9x^2 + 5x^2 = 81 - 25$

$\Rightarrow 14x^2 = 56$

$\Rightarrow x^2 = \frac{56}{14}$

$\Rightarrow x^2 = 4$

$\Rightarrow \qquad x = 2$

Verification

L.H.S $= \frac{2^2-9}{5+2^2}$

$= \frac{4-9}{5+4}$

$= \frac{-5}{9}$

R.H.S $= \frac{-5}{9}$

Hence, L.H.S = R.H.S

(ii) $\frac{y^2+4}{3y^2+7} = \frac{1}{2}$

Sol:

$\frac{y^2+4}{3y^2+7} = \frac{1}{2}$

$\Rightarrow 3y^2 + 7 = 2y^2 + 8$

$\Rightarrow 3y^2 - 2y^2 = 8 - 7$

$\Rightarrow y^2 = 1$

$\Rightarrow \ y = 1$

Verification

L.H.S $= \frac{1^2+4}{3(1)^2+7}$

$= \frac{5}{10}$

$= \frac{1}{2}$

R.H.S $= \frac{1}{2}$

Hence, L.H.S = R.H.S