Solving Rational Equations

Starter Level

Solve these rational equations, leaving your answers exact, or to 3 s. f.

2 $\frac{5x-9}{6}+\frac{2x-4}{7}=1$

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

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

5 $\frac{2x-1}{4}-\frac{x+4}{3}=\frac{5x}{6}$

6 $\frac{4x+1}{2}+\frac{3x-5}{5}=\frac{2x-2}{4}$

8 $\frac{5x}{3}-\frac{4x-1}{8}=\frac{x+2}{6}-\frac{x+1}{12}$

problem solving

9 $\frac{2}{x}-\frac{3x}{4}=\frac{1}{3}$

Answers

1 $\frac{40}{17}$

2 $\frac{129}{47}$

3 $-\frac{14}{9}$

4 $\frac{15}{58}$

5 $-\frac{19}{8}$

6 0

7 $\frac{73}{29}$

8 $\frac{3}{26}$

9 1.426, –1.870 (3 d.p.)

Intermediate Level

Solve these rational equations using appropriate equivalence transformations, and check your answers algebraically. Make sure you check for extraneous solutions.

1 $\frac{4}{x}=\frac{9}{x-2}$

2 $\frac{10}{x+4}=\frac{15}{4(x+1)}$

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

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

6 $\frac{5}{x-2}=7+\frac{10}{x-2}$

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

8 $x+1=\frac{72}{x}$

9 $x+\frac{3}{x+1}=4$

Answers

1 $-\frac{8}{5}$

2 $\frac{4}{5}$

3 $\frac{4}{5}$

4 $\frac{4}{3}$

5 No solutions, $x=2$ is an extraneous solution

6 $\frac{9}{7}$

7 No solutions, $x=2$ is an extraneous solution

8 8, –9

9 3.303, –0.303 (3 d.p.)

Upper Intermediate Level

Solve all rational equations. Check and disqualify any *extraneous* solutions.

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

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

1 $\frac{5}{x-2}-\frac{4}{x}=\frac{10}{x(x-2)}$

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

3 $\frac{10}{x^2-2x}=\frac{5}{x-2}-\frac{4}{x}$

4 $\frac{2x^2-5}{x^2-4}+\frac{6}{x+2}=\frac{4x-7}{x-2}$

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

6 $\frac{x}{x^2-8}=\frac{2}{x}$

Answers

4 2 **5** −6

1 No solutions, $x=2$ is an extraneous solution

2 8

3 No solutions, $x=2$ is an extraneous solution

4 1, 1.5

5 $\frac{8}{5}$

6 ±4

Chal**lenge Level**
(next page)

39. $\frac{x+2}{x^2-6x-27}+\frac{x-17}{x^2-2x-63}=\frac{x+1}{x^2+10x+21}$

40. $\frac{x+3}{x^2-6x-16}+\frac{x-14}{x^2-4x-32}=\frac{x+1}{x^2+6x+8}$

41. $\frac{3x-2}{x^2-17x+72}-\frac{x-4}{x^2-20x+96}=\frac{x-6}{x^2-21x+108}$

42. $\frac{3x-3}{x^2-13x+40}-\frac{x-6}{x^2-22x+112}=\frac{x-9}{x^2-19x+70}$

43. $\frac{x+3}{x^2-6x-16}+\frac{x-14}{x^2-4x-32}=\frac{x+1}{x^2+6x+8}$

44. $\frac{x-6}{x-4}+\frac{x-7}{x-3}=\frac{x+111}{x^2-7x+12}$

45. $\frac{x-4}{x-7}+\frac{x-5}{x-6}=\frac{x+164}{x^2-13x+42}$

46. $\frac{x-4}{x-8}+\frac{x-5}{x-7}=\frac{x+143}{x^2-15x+56}$

47. $\frac{x+5}{x^2-6x-27}+\frac{x-17}{x^2-18x+77}=\frac{x+1}{x^2-14x+33}$

48. $\frac{x+7}{x^2-3x-18}+\frac{x-17}{x^2-x-30}=\frac{x+1}{x^2+8x+15}$

49. $\frac{3x-4}{x^2-10x+21}-\frac{x-8}{x^2-18x+77}=\frac{x-5}{x^2-14x+33}$

50. $\frac{3x-3}{x^2-13x+40}-\frac{x-7}{x^2-19x+70}=\frac{x-2}{x^2-22x+112}$