

A2.A.23: Solving Rationals 1: Solve rational equations and inequalities

1 Which equation is equivalent to $1 - \frac{6}{t^2} = \frac{1}{t}$?

- 1) $(t-3)(t+2) = 0$
- 2) $(t-2)(t+3) = 0$
- 3) $(2t+1)(3t-1) = 0$
- 4) $(2t-1)(3t+1) = 0$

2 What is the solution set of the equation

$$\frac{30}{x^2-9} + 1 = \frac{5}{x-3}?$$

- 1) $\{2,3\}$
- 2) $\{2\}$
- 3) $\{3\}$
- 4) $\{\}$

3 What is the solution set of the equation

$$\frac{x}{x-4} - \frac{1}{x+3} = \frac{28}{x^2-x-12}?$$

- 1) $\{\}$
- 2) $\{4,-6\}$
- 3) $\{-6\}$
- 4) $\{4\}$

4 Solve algebraically for the exact values of x :

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

5 Solve for x : $\frac{2}{x} + \frac{3}{5x} = 1$

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

7 Solve for x : $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

8 Solve algebraically for x : $\frac{3}{x} + \frac{x}{x+2} = -\frac{2}{x+2}$

9 Solve for y : $\frac{y}{y-1} = \frac{8}{y} + \frac{1}{y-1}$

10 Solve: $\frac{x+4}{x-4} - \frac{x-4}{x+4} = 4\frac{4}{5}$

11 Solve: $3 - \frac{2}{x} = \frac{6}{x+1}$

12 Solve: $2x - \frac{1}{2} = \frac{x-1}{x+1} + x + 2$

13 Solve for all values of x : $\frac{9}{x} + \frac{9}{x-2} = 12$

14 For all values of x for which the expression is defined, solve for x : $\frac{3}{x+3} + \frac{2}{x-4} = \frac{4}{3}$

15 Solve for x : $\frac{4x}{x+2} - \frac{12}{x} = 1$

16 Solve algebraically for x : $\frac{1}{x+3} - \frac{2}{3-x} = \frac{4}{x^2-9}$

17 Solve for all values of x : $\frac{2x}{x+3} + \frac{3}{x-3} = \frac{8}{x^2-9}$

18 Solve for x : $\frac{x}{x+5} + \frac{9}{x-5} = \frac{50}{x^2-25}$

19 Solve for x : $\frac{12}{x^2-16} - \frac{24}{x-4} = 3$

20 Solve for x : $\frac{x}{x-5} - \frac{2}{x+5} = \frac{50}{x^2-25}$

21 Working by herself, Mary requires 16 minutes more than Antoine to solve a mathematics problem. Working together, Mary and Antoine can solve the problem in 6 minutes. If this situation is represented by the equation $\frac{6}{t} + \frac{6}{t+16} = 1$, where t represents the number of minutes Antoine works alone to solve the problem, how many minutes will it take Antoine to solve the problem if he works by himself?

A2.A.23: Solving Rationals 1: Solve rational equations and inequalities**Answer Section**

1 ANS: 1 REF: 060227siii

2 ANS: 2

$$\frac{30}{(x+3)(x-3)} + \frac{(x+3)(x-3)}{(x+3)(x-3)} = \frac{5(x+3)}{(x-3)(x+3)} \quad 3 \text{ is an extraneous root.}$$

$$30 + x^2 - 9 = 5x + 15$$

$$x^2 - 5x + 6 = 0$$

$$(x-3)(x-2) = 0$$

$$x = 2$$

REF: 061417a2

3 ANS: 3

$$\frac{x}{x-4} + \frac{-1}{x+3} = \frac{28}{x^2 - x - 12}$$

$$\frac{x(x+3) - 1(x-4)}{(x-4)(x+3)} = \frac{28}{(x-4)(x+3)}$$

$$x^2 + 3x - x + 4 = 28$$

$$x^2 + 2x - 24 = 0$$

$$(x+6)(x-4) = 0$$

$$x = -6 \text{ or } x = 4$$

$x = 4$ is an extraneous solution

REF: 060212b

4 ANS:

$$\frac{10x}{4} = \frac{1}{x} + \frac{x}{4}$$

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

$$9x^2 = 4$$

$$x^2 = \frac{4}{9}$$

$$x = \pm \frac{2}{3}$$

REF: 081534a2

5 ANS:

$$\frac{13}{5}$$

REF: 080308siii

6 ANS:

$$\frac{2}{3}$$

REF: 010410siii

7 ANS:

no solution. $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

$$\frac{4x-12}{x-3} = 2$$

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

$$4 \neq 2$$

REF: fall0930a2

8 ANS:

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

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

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

$$x = -3$$

REF: 061537a2

9 ANS:

$$8$$

REF: 089637siii

10 ANS:

$$6, -\frac{8}{3}$$

REF: 039111al

11 ANS:

$$2, -\frac{1}{3}$$

REF: 090403al

12 ANS:

$$3, -\frac{1}{2}$$

REF: 030502a1

13 ANS:

$$\frac{9(x-2) + 9x}{x(x-2)} = 12$$

$$\frac{9x-18+9x}{x^2-2x} = 12$$

$$18x-18 = 12x^2 - 24x$$

$$3, \frac{1}{2}. \quad 0 = 12x^2 - 42x + 18$$

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

$$0 = (2x-1)(x-3)$$

$$x = \frac{1}{2} \text{ or } x = 3$$

REF: 080529b

14 ANS:

$$-\frac{5}{4}, 6$$

REF: 010042siii

15 ANS:

$$-\frac{4}{3}, 6$$

REF: 080041siii

16 ANS:

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

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

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

$$x-3+2x+6 = 4$$

$$3x = 1$$

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

REF: 081036a2

17 ANS:

$$1, \frac{1}{2}$$

REF: 019840siii

18 ANS:

$$1$$

REF: 069841siii

19 ANS:

$$-6, -2$$

REF: 060138siii

20 ANS:

$$-8$$

REF: 060342siii

21 ANS:

$$\frac{6(t+16) + 6t}{t(t+16)} = 1$$

$$6t + 96 + 6t = t^2 + 16t$$

$$8. \quad 12t + 96 = t^2 + 16t$$

$$0 = t^2 + 4t - 96$$

$$0 = (t+12)(t-8)$$

$$\text{negative or } t = 8$$

REF: 080125b