A.REI.A.2: Solving Rationals 2

1 Which equation could be used to solve
$\dfrac{5}{x-3} - \dfrac{2}{x} = 1$?

1) $x^2 - 6x - 3 = 0$
2) $x^2 - 6x + 3 = 0$
3) $x^2 - 6x - 6 = 0$
4) $x^2 - 6x + 6 = 0$

2 Which value of x is the solution of $\dfrac{2x-3}{x-4} = \dfrac{2}{3}$?

1) $-\dfrac{1}{4}$

2) $\dfrac{1}{4}$

3) -4
4) 4

3 Which value of x is a solution of $\dfrac{5}{x} = \dfrac{x+13}{6}$?

1) -2
2) -3
3) -10
4) -15

4 What is the solution of the equation $\dfrac{x+2}{2} = \dfrac{4}{x}$?

1) 1 and -8
2) 2 and -4
3) -1 and 8
4) -2 and 4

5 What is the solution of the equation $\dfrac{x}{3} = \dfrac{8}{x+2}$?

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

6 What is the solution set of $\dfrac{x+2}{x-2} = \dfrac{-3}{x}$?

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

7 What is the solution of $\dfrac{2}{x+1} = \dfrac{x+1}{2}$?

1) -1 and -3
2) -1 and 3
3) 1 and -3
4) 1 and 3

8 Which value of x is the solution of $\dfrac{1}{5} + \dfrac{2}{x} = \dfrac{1}{3}$?

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

2) -15

3) $2\dfrac{3}{4}$

4) 15

9 What is the solution of the equation $\dfrac{12}{7x} + \dfrac{3}{2x} = \dfrac{15}{14}$?

1) 1
2) 5
3) 3
4) 14

10 What is the value of x in the equation $\dfrac{2}{x} - 3 = \dfrac{26}{x}$?

1) -8

2) $-\dfrac{1}{8}$

3) $\dfrac{1}{8}$

4) 8

11 What is the solution set of $x - \dfrac{10}{x} + 3 = 0$?

1) $\{-5,2\}$
2) $\{-2,5\}$
3) $\{-1,10\}$
4) $\{-10,1\}$

12 What is the solution set of the equation
$\dfrac{30}{x^2 - 9} + 1 = \dfrac{5}{x - 3}$?

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

13 Solve algebraically for all values of x that satisfy
the equation: $\dfrac{x}{x + 4} = \dfrac{3}{x + 2}$

14 Solve for x: $\dfrac{x + 1}{x} = \dfrac{-7}{x - 12}$

15 Solve algebraically for x: $\dfrac{x + 2}{6} = \dfrac{3}{x - 1}$

16 Solve algebraically for all values of x:
$\dfrac{3}{x + 5} = \dfrac{2x}{x^2 - 8}$

17 Solve algebraically for the exact values of x:
$\dfrac{5x}{2} = \dfrac{1}{x} + \dfrac{x}{4}$

18 Solve algebraically for x: $\dfrac{3}{4} = \dfrac{-(x + 11)}{4x} + \dfrac{1}{2x}$

19 Solve for x: $\dfrac{4x}{x - 3} = 2 + \dfrac{12}{x - 3}$

20 Solve algebraically for x: $\dfrac{3}{x} + \dfrac{x}{x + 2} = -\dfrac{2}{x + 2}$

21 Solve algebraically: $\dfrac{2}{3x} + \dfrac{4}{x} = \dfrac{7}{x + 1}$
[Only an algebraic solution can receive full credit.]

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

23 Solve the equation below algebraically, and express
the result in simplest radical form:
$$\dfrac{13}{x} = 10 - x$$

A.REI.A.2: Solving Rationals 2
Answer Section

1   ANS: 3

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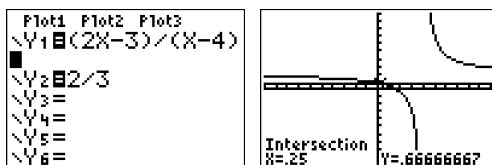
$$5x - 2x + 6 = x^2 - 3x$$

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

REF: 011522a2

2   ANS: 2

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

$$3(2x-3) = 2(x-4)$$
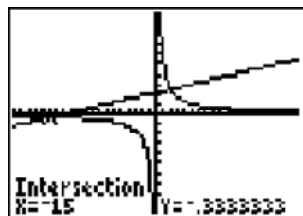
$$6x - 9 = 2x - 8$$

$$4x = 1$$

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

REF: 081012ia

3   ANS: 4

$$\frac{5}{x} = \frac{x+13}{6}$$

$$x^2 + 13x = 30$$

$$x^2 + 13x - 30 = 0$$

$$(x+15)(x-2) = 0$$

$$x = -15 \text{ or } 2$$

REF: 060826ia

4 ANS: 2

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

$$x^2 + 2x = 8$$

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

$$(x+4)(x-2) = 0$$

$$x = -4, 2$$

REF: 061317ia

5 ANS: 2

$$\frac{x}{3} = \frac{8}{x+2}$$
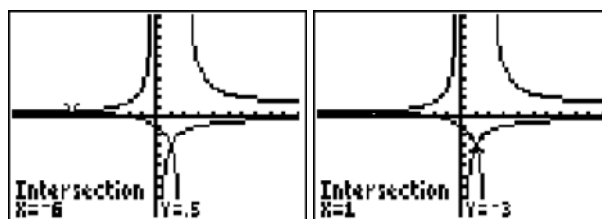
$$x^2 + 2x = 24$$

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

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

$$x = -6, 4$$

REF: 081429ia

6 ANS: 4

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

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

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

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

$$(x+6)(x-1) = 0$$

$$x = -6 \text{ or } 1$$

REF: 011028ia

2

7 ANS: 3

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

$$x^2 + 2x + 1 = 4$$

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

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

$$x = -3, 1$$

REF: 081226ia

8 ANS: 4

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

$$\frac{2}{x} = \frac{2}{15}$$

$$x = 15$$

REF: 061507ia

9 ANS: 3

$$\frac{24}{14x} + \frac{21}{14x} = \frac{15x}{14x}$$

$$45 = 15x$$

$$x = 3$$

REF: 081416ia

10 ANS: 1

$$\frac{2}{x} - 3 = \frac{26}{x}$$

$$-3 = \frac{24}{x}$$

$$x = -8$$

REF: 010918ia

11 ANS: 1

$$x^2 - 10 + 3x = 0$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2) = 0$$

$$x = -5, 2$$

REF: 061616a2

12 ANS: 2

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

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

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

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

$$x = 2$$

REF: 061417a2

13 ANS:

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

$$x^2 + 2x = 3x + 12$$

$$x^2 - x - 12 = 0$$

$$(x-4)(x+3) = 0$$

$$x = 4, -3$$

REF: 061636ia

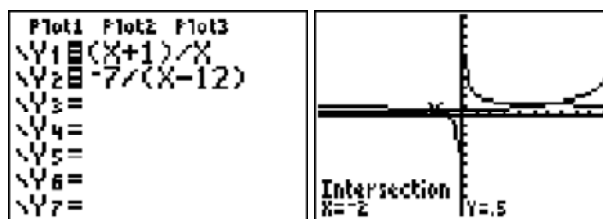14 ANS:

6,–2. $\frac{x+1}{x} = \frac{-7}{x-12}$

$$(x+1)(x-12) = -7x$$

$$x^2 - 11x - 12 = -7x$$

$$x^2 - 4x - 12 = 0$$

$$(x-6)(x+2) = 0$$

$$x = 6 \text{ or } -2$$

REF: fall0739ia

4

15 ANS:

4, −5. $\dfrac{x+2}{6} = \dfrac{3}{x-1}$

$(x+2)(x-1) = 18$

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

$x^2 + x - 20 = 0$

$(x+5)(x-4) = 0$

$x = -5 \text{ or } 4$

REF: 011136ia

16 ANS:

$\dfrac{3}{x+5} = \dfrac{2x}{x^2 - 8}$

$3x^2 - 24 = 2x^2 + 10x$

$x^2 - 10x + 24 = 0$

$(x-12)(x+2) = 0$

$x = 12, -2$

REF: 011438ia

17 ANS:

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

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

$9x^2 = 4$

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

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

REF: 081534a2

18 ANS:

$-\dfrac{9}{4}.$ $\qquad \dfrac{3}{4} = \dfrac{-(x+11)}{4x} + \dfrac{1}{2x}$

$\qquad\qquad \dfrac{3}{4} = \dfrac{-x-11}{4x} + \dfrac{2}{4x}$

$\qquad\qquad \dfrac{3}{4} = \dfrac{-x-9}{4x}$

$\qquad 12x = -4x - 36$

$\qquad 16x = -36$

$\qquad x = -\dfrac{9}{4}$

REF: 061137ia

19 ANS:

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

$\qquad\qquad \dfrac{4x-12}{x-3} = 2$

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

$\qquad\qquad\qquad 4 \neq 2$

REF: fall0930a2

20 ANS:

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

$\qquad \dfrac{x+2}{x+2} = -\dfrac{3}{x}$

$\qquad\qquad 1 = -\dfrac{3}{x}$

$\qquad\quad x = -3$

REF: 061537a2

6

21 ANS:

$$\frac{2}{3x} + \frac{12}{3x} = \frac{7}{x+1}$$

$$\frac{14}{3x} = \frac{7}{x+1}$$

$$21x = 14x + 14$$

$$7x = 14$$

$$x = 2$$

REF: 061337ia

22 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

23 ANS:

$\frac{13}{x} = 10-x$ $\qquad . \; x = \frac{10 \pm \sqrt{100-4(1)(13)}}{2(1)} = \frac{10 \pm \sqrt{48}}{2} = \frac{10 \pm 4\sqrt{3}}{2} = 5 \pm 2\sqrt{3}$

$$13 = 10x - x^2$$

$$x^2 - 10x + 13 = 0$$

REF: 061336a2