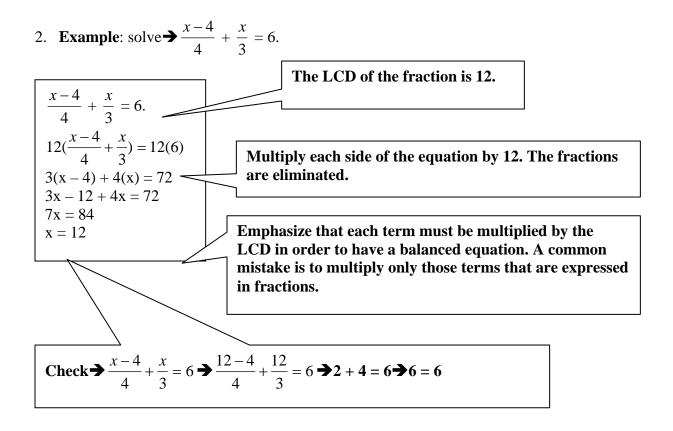
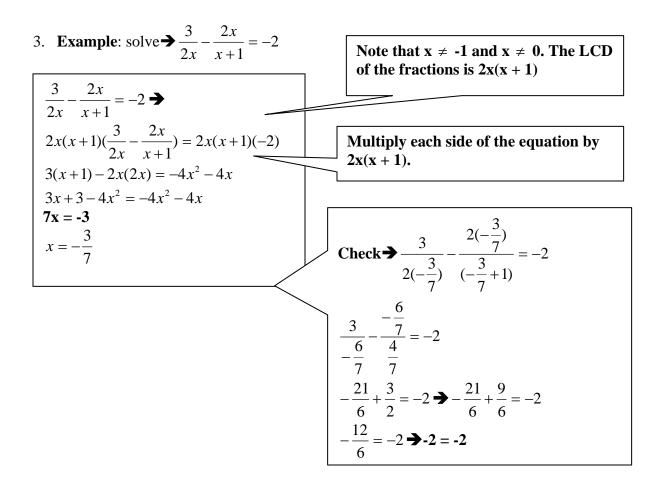
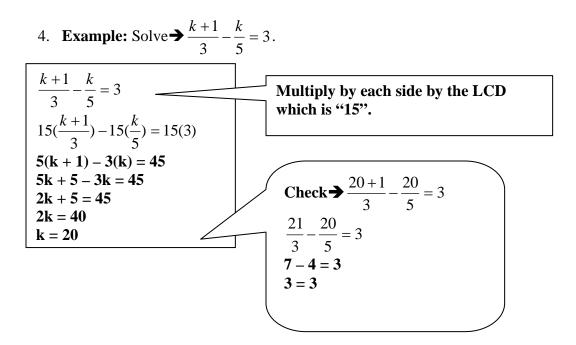
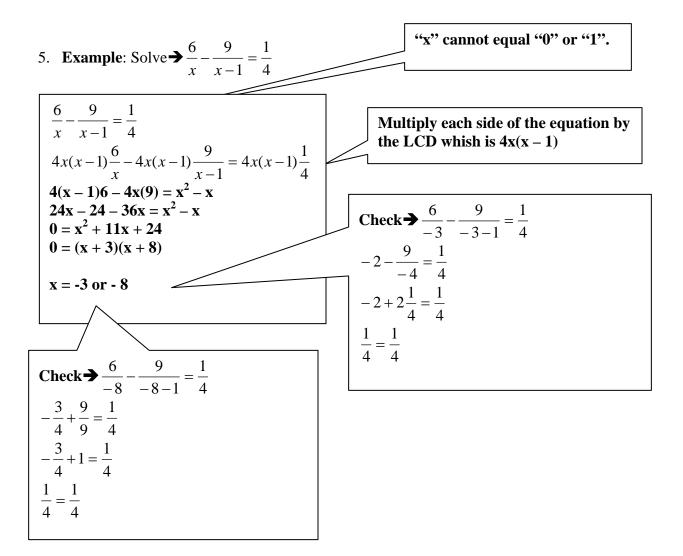
SOLVING RATIONAL EQUATIONS EXAMPLES

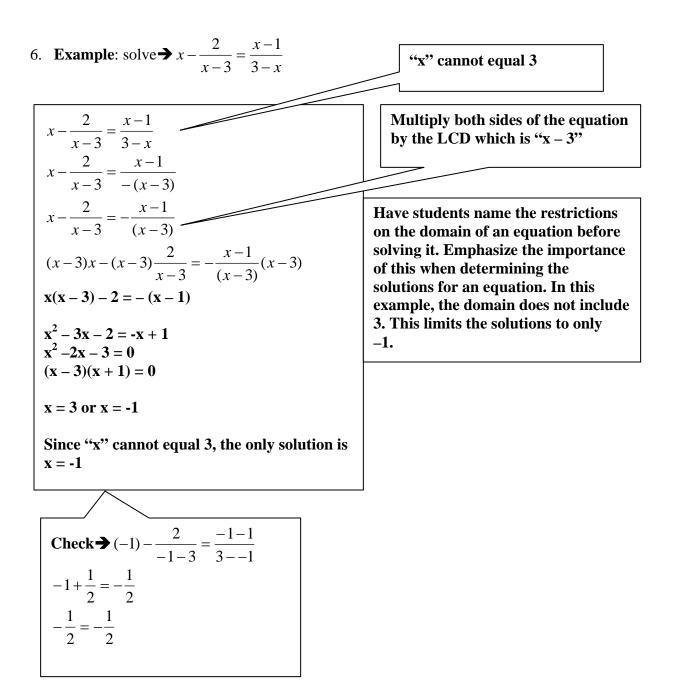
1. Recall that you can solve equations containing fractions by using the least common denominator of all the fractions in the equation. Multiplying each side of the equation by the common denominator eliminates the fractions. This method can also be used with rational equations. **Rational equations** are equations containing rational expressions.











7. Example: solve
$$\Rightarrow \frac{2m}{m-1} + \frac{m-5}{m^2-1} = 1$$

 $\frac{2m}{m-1} + \frac{m-5}{(m+1)(m-1)} = 1$
 $(m-1)(m+1)\frac{2m}{m-1} + (m-1)(m+1)\frac{m-5}{(m+1)(m-1)} = (m+1)(m-1)(1)$
 $2m(m+1) + (m-5) = m^2 - 1$
 $2m^2 + 2m + m - 5 = m^2 - 1$
 $m^2 + 3m - 4 = 0$
 $(m+4)(m-1) = 0$
 $m = -4 \text{ or } 1$
Since "1" cannot be a solution then "m" must equal "-4"

Check:
$$\Rightarrow \frac{2m}{m-1} + \frac{m-5}{(m+1)(m-1)} = 1 \Rightarrow \frac{2(-4)}{-4-1} + \frac{-4-5}{(-4+1)(-4-1)} = 1$$

$$\frac{-8}{-5} + \frac{-9}{(-3)(-5)} = 1 \Rightarrow \frac{24}{15} - \frac{9}{15} = 1 \Rightarrow \frac{15}{15} = 1$$

Name:_	
Date:	
Class:	

SOLVING RATIONAL EQUATIONS WORKSHEET

Solve each equation and check (state excluded values).

1.
$$\frac{2a-3}{6} = \frac{2a}{3} + \frac{1}{2}$$

2. $\frac{2b-3}{7} - \frac{b}{2} = \frac{b+3}{14}$
3. $\frac{3}{5x} + \frac{7}{2x} = 1$
4. $\frac{5k}{k+2} + \frac{2}{k} = 5$
5. $\frac{m}{m+1} + \frac{5}{m-1} = 1$
6. $\frac{4x}{3x-2} + \frac{2x}{3x+2} = 2$
7. $\frac{5}{5-p} - \frac{p^2}{5-p} = -2$
8. $\frac{2a-3}{a-3} - 2 = \frac{12}{a+3}$
9. $\frac{2b-5}{b-2} - 2 = \frac{3}{b+2}$
10. $\frac{4}{k^2 - 8k + 12} = \frac{k}{k-2} + \frac{1}{k-6}$



SOLVING RATIONAL EQUATIONS WORKSHEET KEY

Solve each equation:

1.
$$\frac{2a-3}{6} = \frac{2a}{3} + \frac{1}{2}$$

$$6(\frac{2a-3}{6}) = 6(\frac{2a}{3}) + 6(\frac{1}{2})$$

$$2a - 3 = 2(2a) + 3(1)$$

$$2a - 3 = 4a + 3$$

$$-3 = 2a + 3$$

$$-6 = 2a$$

$$-3 = a$$

Check:

$$\frac{2(-3)-3}{6} = \frac{2(-3)}{3} + \frac{1}{2}$$

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

$$-1\frac{1}{2} = -1\frac{1}{2}$$

2.
$$\frac{2b-3}{7} - \frac{b}{2} = \frac{b+3}{14}$$

$$14(\frac{2b-3}{7}) - 14(\frac{b}{2}) = 14(\frac{b+3}{14})$$

$$2(2b-3) - 7(b) = 1(b+3)$$

$$4b-6-7b = b+3$$

$$-9 = 4b$$

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

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

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

$$\frac{-15}{7} - \frac{-9}{4} = \frac{-9}{4} + 3$$

$$\frac{-15}{7} - \frac{-9}{4} = \frac{-9}{4} + 3$$

$$\frac{-15}{7} - \frac{-9}{4} = \frac{3}{4}$$

$$\frac{-15}{7} + \frac{9}{8} = \frac{3}{56}$$

$$\frac{3}{56} = \frac{3}{56}$$

$$\frac{3}{56} = \frac{3}{56}$$

$$\frac{3}{56} = \frac{3}{56}$$

$$\frac{3}{56} = \frac{3}{56}$$

$$\frac{3}{205} + \frac{7}{82} = 1$$

$$\frac{10x(\frac{3}{5x}) + 10x(\frac{7}{2x}) = 10x(1)}{6+35 = 10x}$$

$$\frac{41}{10} = x$$

$$1 = 1$$

4.
$$\frac{5k}{k+2} + \frac{2}{k} = 5$$

 $k(k+2)\frac{5k}{1(k+2)} + k(k+2)\frac{2}{k} = k(k+2)5$
 $5k^2 + 2k + 4 = 5k^2 + 10k$
 $2k + 4 = 10k$
 $\frac{1}{2} = k$
 $\frac{5(\frac{1}{2})}{\frac{1}{2}+2} + \frac{2}{\frac{1}{2}} = 5$
 $\frac{5}{\frac{2}{5}} + 4 = 5$
 $\frac{5}{\frac{5}{2}} + 4 = 5$
 $5 = 5$

5.
$$\frac{m}{m+1} + \frac{5}{m-1} = 1$$
 "m" cannot equal "-1" or "1"

$$(m+1)(m-1)\frac{m}{1(m+1)} + (m+1)(m-1)\frac{5}{1(m-1)} = (m+1)(m-1)1$$

(m - 1)m + (m + 1)(5) = (m + 1)(m - 1)
m² - m + 5m + 5 = m² - 1
4m + 5 = -1
4m = -6
m = -\frac{3}{2}

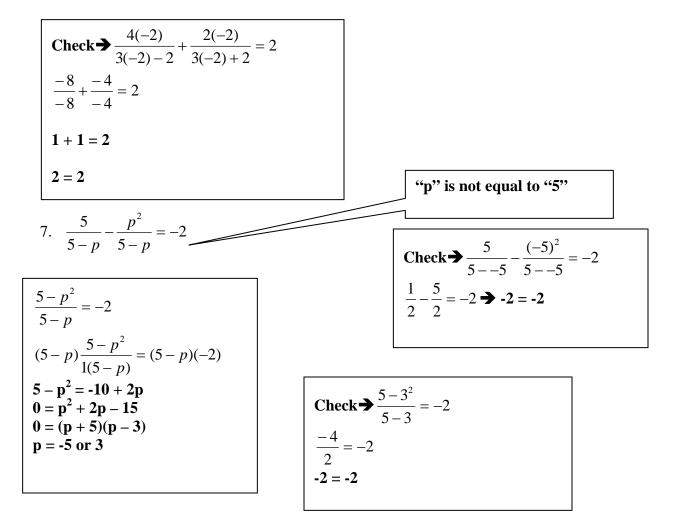
Check
$$\rightarrow \frac{-\frac{3}{2}}{-\frac{3}{2}+1} + \frac{5}{-\frac{3}{2}-1} = 1$$

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

6.
$$\frac{4x}{3x-2} + \frac{2x}{3x+2} = 2$$
 "x" cannot equal $\frac{2}{3}$ or $-\frac{2}{3}$

$$(3x-2)(3x+2)\frac{4x}{1(3x-2)} + (3x-2)(3x+2)\frac{2x}{1(3x+2)} = (3x-2)(3x+2)2$$

(3x+2)4x + (3x-2)2x = 18x² - 8
12x² + 8x + 6x² - 4x = 18x² - 8
4x = -8
x = -2



8.
$$\frac{2a-3}{a-3} - 2 = \frac{12}{a+3}$$
 "a" cannot equal "3" or "-3"

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$$(a-3)(a+3)\frac{2a-3}{1(a-3)} - (a-3)(a+3)2 = (a-3)(a+3)\frac{12}{1(a+3)}$$

(a+3)(2a-3) - 2a² + 18 = (a-3)(12)
2a² + 3a - 9 - 2a² + 18 = 12a - 36
3a + 9 = 12a - 36
45 = 9a
5 = a

Check
$$\rightarrow \frac{2(5)-3}{5-3} - 2 = \frac{12}{5+3}$$

 $\frac{7}{2} - 2 = \frac{12}{8}$
 $\frac{3}{2} = \frac{3}{2}$

9.
$$\frac{2b-5}{b-2} - 2 = \frac{3}{b+2}$$
 "b" cannot equal "2 or "-2"

$$(b-2)(b+2)\frac{2b-5}{1(b-2)} - (b-2)(b+2)2 = (b-2)(b+2)\frac{3}{1(b+2)}$$

(b+2)(2b-5) -2b² + 8 = (b-2)3
2b² -b - 10 - 2b² + 8 = 3b - 6
-b - 2 = 3b - 6
4 = 4b
1 = b

Check
$$\rightarrow \frac{2(1)-5}{1-2} - 2 = \frac{3}{1+2}$$

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

10.
$$\frac{4}{k^2 - 8k + 12} = \frac{k}{k - 2} + \frac{1}{k - 6}$$
 "k" cannot equal "2" or "6"

$$(k - 2)(k - 6)\frac{4}{(k - 2)(k - 6)} = (k - 2)(k - 6)\frac{k}{1(k - 2)} + (k - 2)(k - 6)\frac{1}{1(k - 6)}$$

$$4 = (k - 6)k + (k - 2)1$$

$$4 = k^2 - 6k + k - 2$$

$$0 = k^2 - 5k - 6$$

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

$$k = 6 \text{ or } -1$$
Since "k" cannot equal "6" the solution is "-1"

Check →	$\frac{4}{\left(-1\right)^{2}-8(-1)+12} = \frac{-1}{-1-2} + \frac{1}{-1-6}$
$\frac{\frac{4}{21}}{\frac{4}{21}} = \frac{1}{3} - \frac{4}{21} = \frac{4}{21}$	_

Student Name:

Date: _____

SOLVING RATIONAL EQUATIONS CHECKLIST

- 1. On question 1, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 2. On question 2, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 3. On question 3, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 4. On question 4, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 5. On question 5, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)

- 6. On question 6, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 7. On question 7, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 8. On question 8, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 9. On question 9, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)
- 10. On question 10, did the student solve the equation correctly and check solutions?
 - a. Yes (20 points)
 - b. Solved equation correctly but did not check solutions (15 points)
 - c. Equation was solved incorrectly but had only minor mathematical errors. Student did check solutions (10 points)
 - d. Equation was solved incorrectly and student did not check solutions (5 points)

