M9

Solving Equation with Fractions
3.6 Part 2

Removing Fractions from Equations

2. Equations with several fractions with different denominators.
- **Find the LCM of all the denominators.**
- Put each side in brackets.
- Multiply each side by the **LCM.**
- Reduce and multiply.
- Solve

Examples: **Remove fractions. Do not solve.**

$LCM = 6$

$$\frac{6}{1}\left(\frac{x}{2} + \frac{1}{6}\right) = (5)(6)$$

$$\frac{\overset{3}{\cancel{6}}}{1} \cdot \frac{x}{\cancel{2}_1} + \frac{\cancel{6}}{1} \cdot \frac{1}{\cancel{6}_1} = 30$$

$$3x + 1 = 30$$

$LCM = 20$

$$\left(\frac{20}{1}\right)\left(6x - \frac{3}{4}\right) = \left(\frac{7}{10}\right)\left(\frac{20}{1}\right)$$

$$(20)(6x) - \frac{\overset{5}{\cancel{20}}}{1} \cdot \frac{3}{\cancel{4}} = \frac{7 \cdot 2}{1 \cdot 1}$$

$$120x - \frac{5}{1} \cdot \frac{3}{1} = 14$$

$$120x - 15 = 14$$

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Remove fractions. Do not solve.

$LCM = 21$

$$\left(\frac{21}{1}\right)\left(\frac{6x}{3} - 2\right) = \left(\frac{1}{7}\right)\left(\frac{21}{1}\right)$$

$$\frac{\overset{7}{\cancel{21}}}{1} \cdot \frac{6x}{\cancel{3}_1} - 21(2) = \frac{1}{1} \cdot \frac{3}{1}$$

$$\frac{7}{1} \cdot \frac{6x}{1} - 42 = 3$$

$$\boxed{42x - 42 = 3}$$

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$$\frac{\overset{2}{\cancel{6}}x}{\cancel{3}_1} - 2 = \frac{1}{7}$$

$$(7)(2x - 2) = \left(\frac{1}{7}\right)\left(\frac{7}{1}\right)$$

$$\boxed{14x - 14 = 1}$$

$LCM = 18$

$$\left(\frac{18}{1}\right)\left(\frac{-2x}{3} - \frac{4}{9}\right) = \left(-\frac{1}{2}\right)\left(\frac{18}{1}\right)$$

$$\left(\frac{\overset{6}{\cancel{18}}}{1}\right) \cdot \left(\frac{-2x}{\cancel{3}_1}\right) - \left(\frac{\overset{2}{\cancel{18}}}{1}\right) \cdot \left(\frac{4}{\cancel{9}_1}\right) = \frac{-9}{1}$$

$$\left(\frac{6}{1}\right) \cdot \left(\frac{-2x}{1}\right) - \left(\frac{8}{1}\right) = \frac{-9}{1}$$

$$\boxed{-12x - 8 = -9}$$

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Examples: Solve Equations. Start with removing fractions from both sides. **Check your answers by showing that LS=RS after substituting into the original equation.**

Left column (top):

$LCM = 30$

$$\frac{30}{1}\left(-\frac{x}{15} + \frac{3}{10}\right) = (2)(30)$$

$$\left(\frac{30}{1}\right)\left(-\frac{x}{15}\right) + \left(\frac{30}{1}\right)\cdot\left(\frac{3}{10}\right) = 60$$

$$\left(\frac{2}{1}\right)\cdot\frac{(-x)}{1} + \frac{3}{1}\cdot\frac{3}{1} = 60$$

$$\boxed{-2x + 9 = 60}$$

Right column (top):

$LCM = 30$

$$\left(\frac{30}{1}\right)\left(3x - \frac{2}{5}\right) = \left(-\frac{7}{6}\right)\left(\frac{30}{1}\right)$$

$$(30)\cdot(3x) - \left(\frac{30}{1}\right)\cdot\left(\frac{2}{5}\right) = \left(-\frac{7}{1}\right)\cdot\left(\frac{5}{1}\right)$$

$$90x - \left(\frac{6}{1}\right)\cdot\left(\frac{2}{1}\right) = -35$$

$$90x - 12 = -35$$

Left column Check:

Check:

$$-2x + 9 = 60$$
$$\; -9 \quad -9$$
$$-2x = 51$$
$$\overline{-2} \qquad \overline{-2}$$
$$\boxed{x = \frac{51}{-2} = \frac{-51}{2} = 25.5}$$

$$-\frac{x}{15} + \frac{3}{10} = 2$$

$$\frac{\left(\frac{-51}{2}\right)}{15} + \frac{3}{10} = 2$$

$$1.7 + 0.3 = 2$$

$$2 = 2 \quad \boxed{LS = RS \checkmark}$$

Right column Check:

Check:

$$90x - 12 = -35$$
$$\; +12 \qquad +12$$
$$90x = -23$$
$$\overline{90} \qquad \overline{90}$$
$$\boxed{x = -\frac{23}{90}}$$

$$3x - \frac{2}{5} = -\frac{7}{6}$$

$$3\left(\frac{-23}{90}\right) - \frac{2}{5} = \frac{-7}{6}$$

$$\left(\frac{3}{1}\right)\cdot\left(\frac{-23}{90}\right) - \frac{2\cdot 6}{5\cdot 6} = \frac{-7}{6}$$

$$\frac{-23 - 12}{30} = \frac{-7}{6}$$

$$-\frac{35}{30}\cdot\frac{7}{6} = \frac{-7}{6}$$

$$-\frac{7}{6} = -\frac{7}{6} \quad \boxed{LS = RS \checkmark}$$

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Your Turn: Solve Equations. Start with removing fractions from both sides. **Check your answers by showing that LS=RS after substituting into the original equation.**

LCM = 12

$$\left(\frac{\cancel{12}^{3}}{1}\right)\left(\frac{x}{4}\right)=\left(\frac{2}{3}\right)\left(\frac{\cancel{12}^{4}}{1}\right)$$

$$\left(\frac{3}{1}\right)\cdot\left(\frac{x}{1}\right)=\left(\frac{2}{1}\right)\cdot\left(\frac{4}{1}\right)$$

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

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

LCM = 20

$$\frac{\cancel{20}}{1}\left(\frac{7x}{20}-2\right)=\left(-\frac{3}{5}\right)\frac{\cancel{20}^{4}}{1}$$

$$\left(\frac{\cancel{20}}{1}\right)\cdot\left(\frac{7x}{\cancel{20}}\right)-(20)(2)=\frac{-3}{1}\cdot\frac{4}{1}$$

$$7x-40=-12$$
$$\qquad +40 \qquad +40$$

$$\frac{7x}{7}=\frac{28}{7}$$

$$x=4$$

Check: $\dfrac{x}{4}=\dfrac{2}{3}$

$$\frac{\left(\frac{8}{3}\right)}{4}=\frac{2}{3}$$

$$\frac{(2.67)}{4}=0.\overline{6}$$

$$0.\overline{6}=0.\overline{6}$$

$$\boxed{LS=RS\checkmark}$$

Check: $\dfrac{7x}{20}-2=\dfrac{-3}{5}$

$$\frac{7(4)}{20}-2=\frac{-3}{5}$$

$$\frac{28}{20}-2=\frac{-3}{5}$$

$$1.4-2=\frac{-3}{5}$$

$$-0.6=\frac{-3}{5}$$

$$-0.6=-0.6$$

$$\boxed{LS=RS\checkmark}$$