March 20, 2018

10-3 Solving Rational Equations

Objectives:

10-3a I can solve a rational equation algebraically

10-3b I can identify extraneous solutions

10-3c I can solve real-world problems using rational equations

Cross-Multiply

Check for extraneous solutions.

$$\frac{3}{4} = \frac{x}{8}$$

$$\frac{24}{4} = \frac{4x}{4}$$

$$x = 6$$

$$\frac{2}{x} = \frac{x}{8}$$

$$\sqrt{16} = \sqrt{x^2}$$

$$x = 4$$

Cross-Multiply

Check for extraneous solutions.

$$\frac{3}{4}=\frac{x+1}{8}$$

$24 = 4x + 4$

$-4 \qquad -4$

$\frac{20}{4} = \frac{4x}{4}$ $x = 5$

$$\frac{1}{x-2}=\frac{x+2}{5x-10}$$

$(x-2)(x+2) = 5x-10$

$x^2 - 4 = 5x - 10$

$+10 \qquad +10$

$x^2 + 6 = 5x$

$-5x \qquad -5x$

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

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

$x-3=0 \quad x-2=0$

$x = 3, 2$

Can we cross multiply? If not, what do we do?

(Don't forget! Check for extraneous solutions.)

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

$$\frac{-2x-12}{x(x+4)}=\frac{2}{x+4}$$

$$\frac{(-2x-12)(x+4)}{x+4}=\frac{2x(x+4)}{x+4}$$

$$-2x-12=2x$$

$+12x \qquad +2x$

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

$$x=-3$$

Solve the rational equation algebraically.

$$2a \cdot \frac{3a}{6a} + \frac{2a+3}{12a^2} = \frac{1}{12}$$

$$2a \cdot$$

$$\frac{6a^2+2a+3}{12a^2} = \frac{1}{12}$$

$$\frac{12 \cdot (6a^2+2a+3)}{12} = \frac{12 \cdot a^2}{12}$$

$$6a^2+2a+3 = a^2$$

$$-a^2 \qquad -a^2$$

$$5a^2+2a+3=0$$

Solve the rational equation algebraically.

$$\frac{x^2}{(x+3)} - \frac{x-2}{(x+1)} = \frac{8}{(x+3)(x+1)}$$

Your Turn

4. Kevin can clean a large aquarium tank in about 7 hours. When Kevin and Lara work together, they can clean the tank in 4 hours. Write and solve a rational equation to determine how long, to the nearest tenth of an hour, it would take Lara to clean the tank if she works by herself. Explain whether the answer is reasonable.

$$x \cdot \frac{1}{7} + \frac{1}{x} \cdot 7 = \frac{1}{4}$$

$$\frac{x+7}{7x} = \frac{1}{4}$$

$$4x + 28 = 7x$$

$$-4x \qquad -4x$$

$$\frac{28}{3} = \frac{3x}{3}$$

$$x = 9.3$$