(11) $\frac{4x+12}{x^2+5x+6}$ and $\frac{5x+15}{10x+20}$

$(x+2)(x+3)$ $\quad$ $10(x+2)$

LCD: $(x+2)(x+3)\cdot 10$

$10(x+2)(x+3)$

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(9) $\frac{x+2}{x^2-3x-4} - \frac{x}{(x+1)} \cdot \frac{(x-4)}{(x-4)}$

$(x-4)(x+1)$

LCD: $(x-4)(x+1)$

$x \neq 4, -1$

$\frac{(x+2)}{(x-4)(x+1)} \oplus \frac{-(x^2+4x)}{(x+1)(x-4)}$

$$\frac{-x^2+5x+2}{(x-4)(x+1)}$$

6-3 Solving Rational Equations

Objectives:

I can solve a rational equation algebraically

I can identify extraneous solutions

I can solve real-world problems using rational equations

$\frac{6}{13} = \frac{2x}{13}$ $x=3$

$6 = 2x$

Solve for the variable. Check for extraneous solutions.

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

$x \neq -1$

$3x+2 = 5x+1$

$-3x \quad -3x$

$2 = 2x+1$

$-1 \quad -1$

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

$x = 1/2$

(excluded values)

2. $\frac{8}{(x+3)} = \frac{x+1}{(x+6)}$

$x=-3, -6$

$8(x+6) = (x+1)(x+3)$

$8x+48 = x^2+3x+1x+3$

$8x+48 = x^2+4x+3$

$-8x-48 \quad -8x-48$

$0 = x^2-4x-45$

$0 = (x-9)(x+5)$

$x = 9, -5$

Solve each rational equation algebraically, then check graphically.

(A) $\frac{3x+7}{x-5} = \frac{5x+17}{2x-10}$

$2(x-5)$

$x \neq 5$

$2(3x+7) = 5x+17$

$6x+14 = 5x+17$

$-5x \quad -14 \quad -5x \quad -14$

$x = 3$

(B) $\frac{2x-9}{(x-7)} + \frac{5}{(2)(x-7)}$

LCD: $2(x-7)$

$x \neq 7$

$2(2x-9) + x(x-7) = 5 \cdot 2$

$4x-18 + x^2-7x = 10$

$x^2-3x-18 = 10$

$-10 \quad -10$

$x^2-3x-28 = 0$

$(x-7)(x+4) = 0$

$x = 7, -4$

$x = -4$

Solve the rational equation algebraically and check graphically.

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

LCD: $6x$

$x \neq 0$

$12 - 1x = 15 - 2x$

$+2x \quad +2x$

$12 + x = 15$

$-12 \quad -12$

$x = 3$

$\frac{x^2-29}{x^2-10x+21} = \frac{6}{x-7} + \frac{5}{x-3}$

$(x-7)(x-3)$

LCD: $(x-7)(x-3)$

$x \neq 7, 3$

$x^2-29 = 6(x-3)+5(x-7)$

$x^2-29 = 6x-18+5x-35$

$x^2-29 = 11x-53$

$-11x+53 \quad -11x+53$

$x^2-11x+24 = 0$

$(x-8)(x-3) = 0$

$x = 8, 3$

10. Jake can mulch a garden in 30 minutes. Together, Jake and Ross can mulch the same garden in 16 minutes. How much time t, in minutes, will it take Ross to mulch the garden when working alone?

J+R

Jake + Ross = Together

$$\frac{16t}{16t}\cdot\frac{1}{30} + \frac{30\cdot16}{30\cdot16}\cdot\frac{1}{t} = \frac{1}{16}\cdot\frac{30t}{30t}$$

CD: $30\cdot16\cdot t$

$$16t + 480 = 30t$$
$$-16t \qquad -16t$$
$$480 = 14t$$

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.

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

A plane flies 990 miles west (into the wind) and makes the return trip following the same flight path. The effect of the wind on the plane is 20 mph. The round trip takes 10 hours. What is the speed of the plane in still air?