(39) Solve $\frac{3x}{x-5} - \frac{2x}{x+1} = \frac{-42}{x^2-4x-5}$

LCD $= (x-5)(x+1)$

$x \neq 5, -1$

$(x-5)(x+1)\frac{3x}{x-5} - \frac{2x}{x+1}(x-5)(x+1) = \frac{-42}{(x-5)(x+1)}(x-5)(x+1)$

$x =$ number

$3x(x+1) - 2x(x-5) = -42$

$3x^2 + 3x - 2x^2 + 10x = -42$

$x^2 + 13x = -42$

$+42 \quad +42$

$x^2 + 13x + 42 = 0$

$(x+6)(x+7) = 0$

Solving a Rational Equation

$x+6=0$

$-6 \quad -6$

$x = -6$ OR $x = -7$

$\{-7, -6\}$

(32) $\frac{10}{x^2-25} - \frac{1}{x-5} = \frac{3}{x+5}$

LCD $= (x-5)(x+5)$

$x \neq 5, -5$

$\frac{(x-5)(x+5)10}{(x+5)(x-5)} - \frac{1(x-5)(x+5)}{x-5} = \frac{3(x-5)(x+5)}{x+5}$

$10 - 1(x+5) = 3(x-5)$

$10 - x - 5 = 3x - 15$

$-x + 5 = 3x - 15$

$+x \qquad +x$

$5 = 4x - 15$

$+15 \qquad +15$

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

$5 = x$ oops

no solution

Work Problems

① Sally takes 4 hours to mow the lawn and Juan takes 7 hours to mow the lawn. How long will it take if they work together?

* let x = the # of hours it takes working together

LCD = $28x$

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

$$7x + 4x = 28$$

$$\frac{11x}{11} = \frac{28}{11}$$

$$x = 2\frac{6}{11}$$

2.54

Working together it will take about 2.54 hours

$2\frac{6}{11}$

Sally - 4
Juan - 7

let x = # of hours together

$$x\left(\frac{1}{4}\right) + x\left(\frac{1}{7}\right) = 1$$

$$28\left(\frac{x}{4} + \frac{x}{7}\right) = 1(28)$$

$$7x + 4x = 28$$

$$\frac{11x}{11} = \frac{28}{11}$$

$$x = \frac{28}{11}$$

Write a sentence

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fills 20 hours

empties 25 hours

in - positive

out - negative

let x = # of hours to fill with both pipes open

$$100x\left(\frac{1}{20} - \frac{1}{25} = \frac{1}{x}\right)100x$$

$$5x - 4x = 100$$

$$x = 100$$

With both pipes open, it will take 100 hours to fill the tank.

Ratios vs Rates

"The ratio of a to b"

$$\frac{a}{b} \qquad b \neq 0$$

The ratio of 4 to 32

$$\frac{4}{32} = \frac{1}{8}$$

<u>A ratio</u> - comparing items with the same units

330 22 students
14 are women

The ratio of women to total class

$$\frac{14}{22} = \frac{7}{11}$$

$$\frac{14 \text{ people}}{22 \text{ people}} = \frac{7}{11}$$

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A <u>rate</u> is a comparison of two items with different units

It took 3 hrs to drive 171 mi

The rate is $\frac{171 \text{ mi}}{3 \text{ hrs}} = 57 \frac{\text{mi}}{\text{hr}}$

7.6 Complex Fractions

a fraction that contains fractions

1ST

ex $\dfrac{\frac{1}{3}}{\frac{5}{6}} = \frac{1}{3} \cdot \frac{6}{5} = \frac{2}{5}$ → $\frac{6}{15} = \frac{2}{5}$

$\dfrac{\frac{3}{3}\frac{2}{1} + \frac{1}{3}}{\frac{6}{6}\frac{2}{1} - \frac{1}{6}} = \dfrac{\frac{6}{3} + \frac{1}{3}}{\frac{12}{6} - \frac{1}{6}}$

ex $\dfrac{\frac{x}{x}y - \frac{1}{x}}{\frac{y}{y}x - \frac{1}{y}} = \dfrac{\frac{xy}{x} - \frac{1}{x}}{\frac{xy}{y} - \frac{1}{y}}$

$\dfrac{\frac{7}{3}}{\frac{11}{6}} = \frac{7}{3} \cdot \frac{6}{11} = \frac{14}{11}$

$= \dfrac{\frac{xy-1}{x}}{\frac{xy-1}{y}} = \left(\frac{xy-1}{x}\right)\left(\frac{y}{xy-1}\right) = \frac{y}{x}$

2nd

$$\frac{xy\left(y-\frac{1}{x}\right)}{xy\left(x-\frac{1}{y}\right)}$$

$$\frac{xy^2-y}{x^2y-x}$$

$$\frac{y(xy-1)}{x(xy-1)}$$

$$\frac{y}{x}$$

LCd = xy

LCd = 6

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

$$\frac{12+2}{12-1}$$

$$\frac{14}{11}$$

the same as

(14) (14)

$$\frac{\frac{3}{x-5}}{\frac{x+1}{x^2-25}}$$

$$\frac{3}{x-5} \cdot \frac{x^2-25}{x+1}$$

$$\frac{3(x-5)(x+5)}{(x-5)(x+1)}$$

$$\frac{3(x+5)}{x+1}$$

LCd $= 4x^2$

$$\frac{\left(\frac{1}{2x}\right) + \left(\frac{y}{2x}\right)}{\left(\frac{1}{4}\right) + \left(\frac{y}{4x}\right)} \cdot \frac{4x^2}{4x^2}$$

$$\frac{2x + 2y}{x^2 + xy}$$

$$\frac{2(x+y)}{x(x+y)}$$

$$\frac{2}{x}$$

(22) $\dfrac{a^2(1)+\left(\frac{1}{a}\right)a^2}{a^2(1)-\frac{1}{a^2}(a^2)}$

$\dfrac{a^2+a}{a^2-1}$

$\dfrac{a(a+1)}{(a+1)(a-1)}$

$\dfrac{a}{a-1}$

LCD $= a^2$

$a^2(1)$ $\qquad \dfrac{a^2}{a} = a^{2-1} = a$

$\dfrac{\frac{a}{a}(1)+\frac{1}{a}}{\frac{a^2}{a^2}1-\frac{1}{a^2}}$

$\dfrac{\frac{a}{a}+\frac{1}{a}}{\frac{a^2}{a^2}-\frac{1}{a^2}}$

$\dfrac{\frac{a+1}{a}}{\frac{a^2-1}{a^2}}$

$\left(\dfrac{a+1}{a}\right)\left(\dfrac{a^2}{a^2-1}\right)$

$\left(\dfrac{a+1}{a}\right)\left(\dfrac{a\cdot a}{(a-1)(a+1)}\right)$

$\dfrac{a}{a-1}$