

Rational Functions

Objective: To apply the properties of rational functions to solve for a variable

How would you solve:

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Rational Functions \Rightarrow Fractions

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

\swarrow SAME Denominators

$$\frac{5}{8} + \frac{7}{8} = \frac{5+7}{8} = \frac{12}{8} = \frac{3}{2}$$

\swarrow same

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

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*
 $10 \cdot \frac{1}{2} + 5 \cdot \frac{3}{4} + 6 \cdot \frac{4}{5} =$
 $10 \cdot \frac{2}{2} + 5 \cdot \frac{3}{4} + 6 \cdot \frac{4}{5} =$
 Same?
 $2 \cdot 4 \cdot 5 =$
 $8 \cdot 5 = 40$
 $20 \cdot \frac{1}{2} + 10 \cdot \frac{3}{4} + 6 \cdot \frac{6}{5}$
 $\frac{20}{40} + \frac{30}{40} + \frac{48}{40} = \frac{98}{40} \div 2$
 $= \frac{49}{20}$

20
22
24
26

$\frac{10}{2} + \frac{15}{2} + \frac{24}{20} = \frac{49}{20}$

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

$\frac{3x}{x+1} + \frac{5x}{x+1} = \frac{8x}{x+1}$

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

$$\frac{6x-5}{x+1} - \frac{4x-3}{x+1} = \frac{2x-2}{x+1} \text{ GCF}$$

$(6x-5)-(4x-3)$
 $6x-5-4x+3$

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

$$\frac{6x-5}{x-1} - \frac{4x-3}{x-1} = \frac{2x-2}{x-1}$$

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

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Remember

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

$$\frac{(x+2) \cdot 3x}{(x+2)(x+1)} + \frac{x}{(x+2)(x+1)}$$

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

$$\frac{3x^2+6x}{(x+2)(x+1)} + \frac{x^2+x}{(x+2)(x+1)}$$

$$\frac{3x^2+6x+(x^2+x)}{(x+2)(x+1)}$$

GCF

$$\frac{4x^2+7x}{(x+2)(x+1)} = \frac{x(4x+7)}{(x+2)(x+1)}$$

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How to add rational functions

* common denominator

Remember:

$$\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$$

+3
4

Same ✓

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

3x+2x
5x

Same ✓

Notes:

$$\frac{1}{5} + \frac{4}{5} + \frac{7}{5} = \frac{12}{5}$$

$$\frac{x}{5} + \frac{6x}{5} + \frac{2x}{5} = \frac{9x}{5}$$

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$$\frac{1}{5} + \frac{1}{4} + \frac{1}{3} =$$

ARE the Denominators
the SAME?

$2 \cdot \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$
 $2 \cdot \frac{1}{5} = \frac{2}{5}$
 $2 \cdot \frac{1}{3} = \frac{2}{3}$
 $3 \cdot \frac{1}{5} = \frac{3}{5}$
 $3 \cdot \frac{1}{4} = \frac{3}{4}$
 $3 \cdot \frac{1}{2} = \frac{3}{2}$
 $4 \cdot \frac{1}{5} = \frac{4}{5}$
 $4 \cdot \frac{1}{4} = 1$
 $4 \cdot \frac{1}{3} = \frac{4}{3}$
 $5 \cdot \frac{1}{5} = 1$
 $5 \cdot \frac{1}{4} = \frac{5}{4}$
 $5 \cdot \frac{1}{3} = \frac{5}{3}$
 $6 \cdot \frac{1}{5} = \frac{6}{5}$
 $6 \cdot \frac{1}{4} = \frac{3}{2}$
 $6 \cdot \frac{1}{3} = 2$

$$\frac{12}{12} \cdot \frac{1}{5} + \frac{15}{15} \cdot \frac{1}{4} + \frac{20}{20} \cdot \frac{1}{3} =$$

$$\frac{12}{60} + \frac{15}{60} + \frac{20}{60} = \frac{47}{60}$$

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$\frac{3x}{x-1} + \frac{6x}{x-1}$ $\frac{9x}{x-1}$	$\frac{1}{x+1} + \frac{2}{x+1} = \frac{3}{x+1}$ <p style="text-align: center; color: red;">SAME</p>
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$\frac{3}{x-1} + \frac{4}{x-1}$	<p style="color: red;">Are the denominators the same?</p> <p style="color: red;">YES</p>	$\frac{3+4}{x-1}$
$\frac{2x}{x^2-4x+1} + \frac{6x}{x^2-4x+1}$	<p style="color: red;">YES</p>	$\frac{2x+6x}{x^2-4x+1}$
$\frac{3x+2}{x^2-x+7} + \frac{6x-5}{x^2-x+7}$	<p style="color: red;">YES</p>	$\frac{3x+2+6x-5}{x^2-x+7}$

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$$\frac{3}{(x+1)} + \frac{5}{(x+2)} \quad \text{Not common denominator}$$

$$\frac{(x+2) \cdot 3}{(x+2) \cdot (x+1)} + \frac{5 \cdot (x+1)}{(x+2) \cdot (x+1)}$$

$$\frac{3x+6}{(x+2)(x+1)} + \frac{5x+5}{(x+2)(x+1)}$$

$$\frac{3x+6}{(x+2)(x+1)} + \frac{5x+5}{(x+2)(x+1)}$$

$$\frac{(3x+6) + (5x+5)}{(x+2)(x+1)}$$

$$\frac{3x+6+5x+5}{(x+2)(x+1)} = \frac{(8x+11)}{(x+2)(x+1)}$$

Remember

$$3 \cdot \frac{2}{5} + \frac{1 \cdot 5}{3 \cdot 5}$$

$$\frac{6}{15} + \frac{5}{15} = \frac{11}{15}$$

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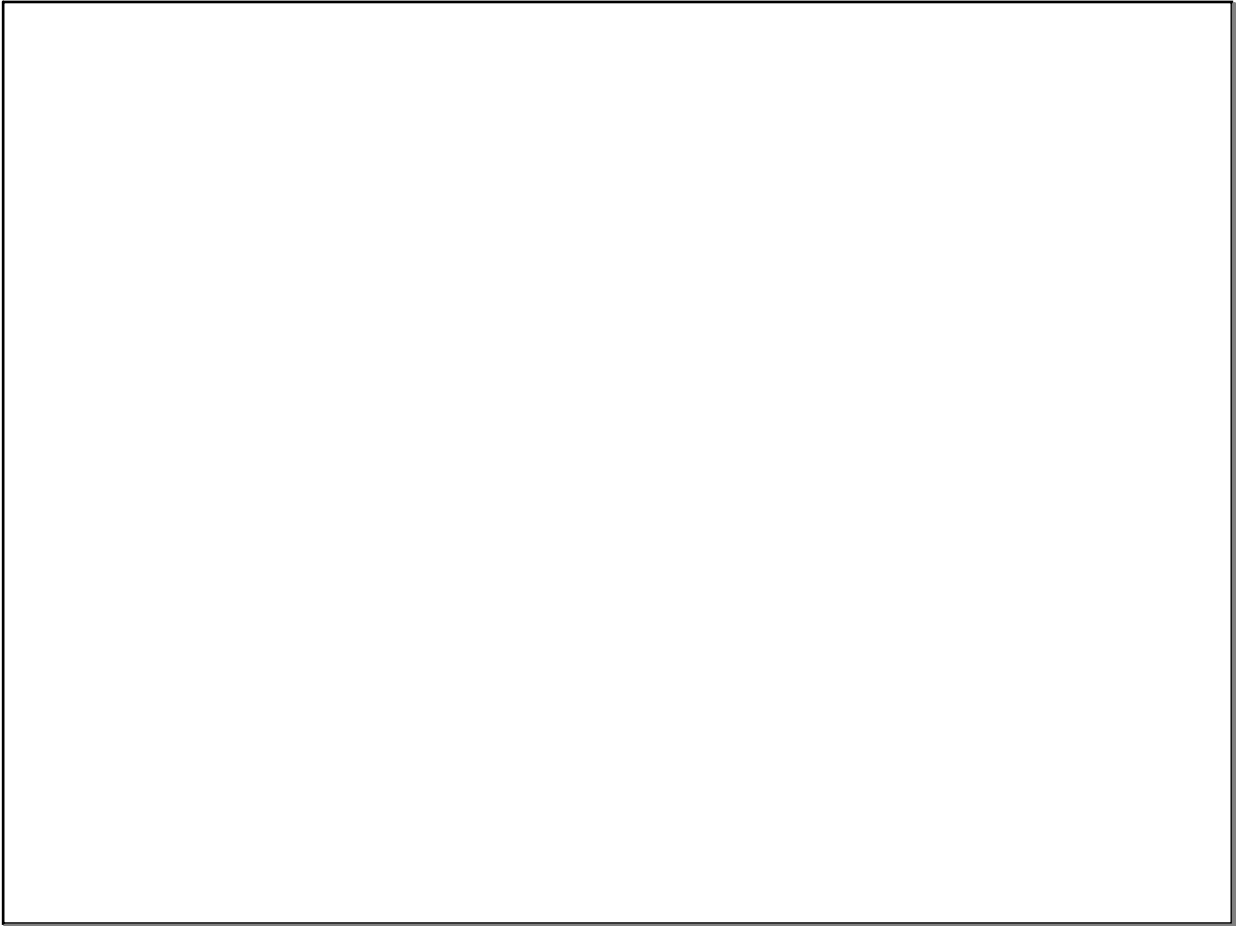
Homework :

$$\textcircled{1} \quad \frac{3x+2}{x+5} + \frac{2x-5}{x+5}$$

$$\textcircled{2} \quad \frac{3x}{5x+1} - \frac{4x}{5x+1}$$

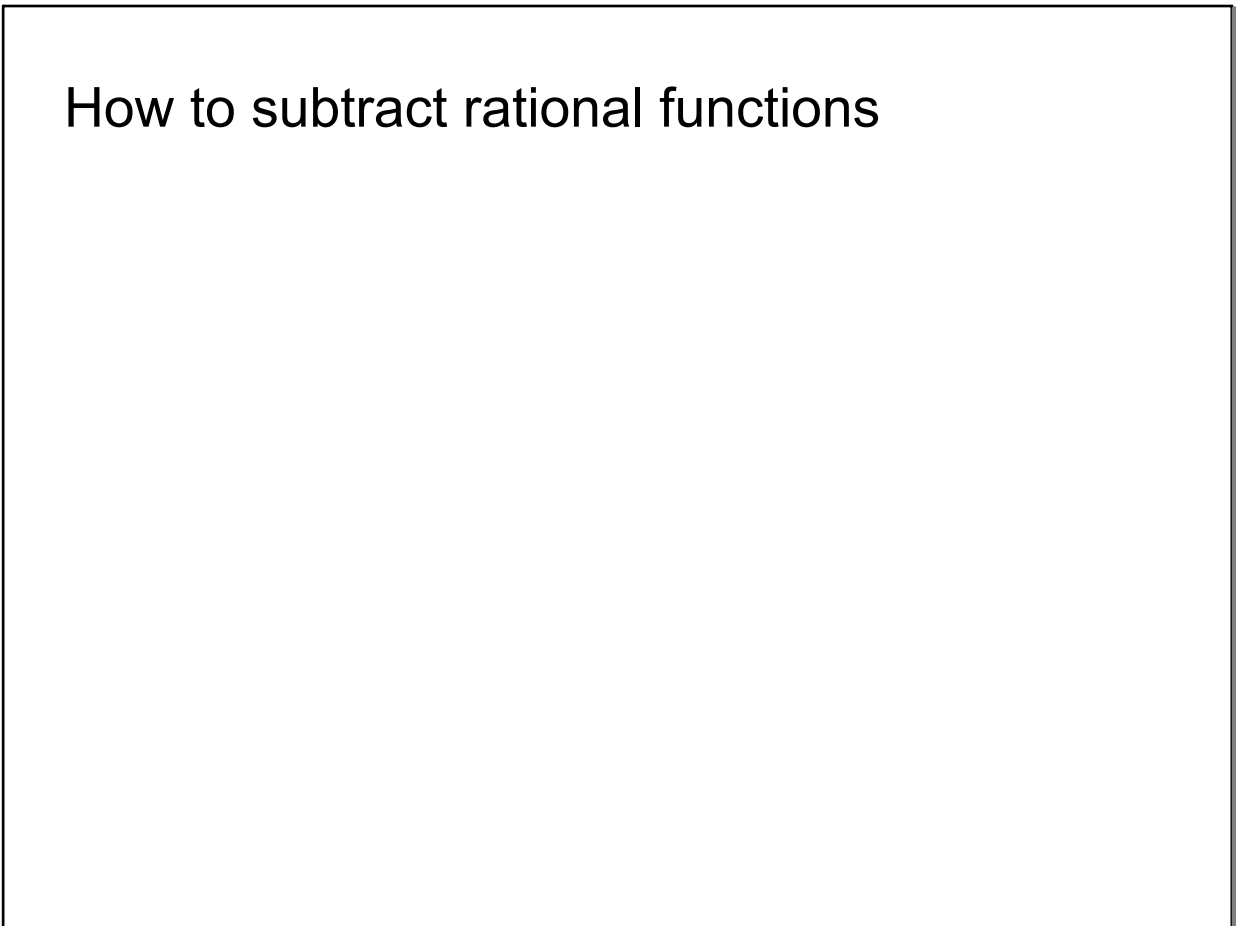
$$\textcircled{3} \quad \frac{2x-1}{x+2} + \frac{3x+2}{x+5}$$

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How to subtract rational functions



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How to multiply rational functions

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How to divide rational functions

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