

# Homework Qs

Note Title

4/14/2015

6.1 #49

$$\frac{xy + 3x + 2y + 6}{xy + 3x + 5y + 15}$$

$$= \frac{(y+3)(x+2)}{(y+3)(x+5)}$$

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

Scratchwork

Factor by grouping:

$$\begin{aligned} & xy + 3x + 2y + 6 \\ & (xy + 3x) + (2y + 6) \\ & x(y+3) + 2(y+3) \\ & (y+3)(x+2) \end{aligned}$$

check:  $xy + 2y + 3x + 6$  ✓

$$\begin{aligned} & xy + 3x + 5y + 15 \\ & (xy + 3x) + (5y + 15) \\ & x(y+3) + 5(y+3) \\ & (y+3)(x+5) \end{aligned}$$

check:  $xy + 5y + 3x + 15$  ✓

$$6.1 \#39 \quad \frac{x^3 - y^3}{x^2 - y^2} = \frac{(x-y)(x^2 + xy + y^2)}{(x+y)(x-y)} = \boxed{\frac{x^2 + xy + y^2}{x+y}}$$

## 6.2: Multiplying and Dividing Rational Expressions (cont'd)

Ex. Simplify.

$$(x+2) \cdot \frac{5}{4x^2 - 16} = \frac{x+2}{1} \cdot \frac{5}{4(x^2 - 4)}$$

$$= \frac{x+2}{1} \cdot \frac{5}{4(x+2)(x-2)} = \boxed{\frac{5}{4(x-2)}} = \boxed{\frac{5}{4x-8}}$$

Both ok

Ex:  $\frac{3x^2yz}{2x^4y^2z^3} \div \frac{12xy^2z^2}{xyz}$

$$= \frac{3x^2yz}{2x^4y^2z^3} \cdot \frac{xyz}{12xy^2z^2}$$

$$= \frac{\cancel{3}x^{\cancel{2}}y^{\cancel{1}}z^{\cancel{1}}}{\cancel{2}4x^{\cancel{4}}y^{\cancel{2}}z^{\cancel{3}}} = \frac{1}{8x^2y^2z^3}$$

Recall:  
Dividing by a number  
is the same  
as multiplying by  
its reciprocal.

Ex:  $\frac{1/2}{3/5} = \frac{1}{2} \div \frac{3}{5}$   
 $= \frac{1}{2} \cdot \frac{5}{3} = \boxed{\frac{5}{6}}$

Ex: Simplify.

$$\frac{8x^2-16x+32}{2x^4+16x} \div \frac{4x^2-4x-8}{x^3-4x}$$

$$= \frac{8x^2-16x+32}{2x^4+16x} \cdot \frac{x^3-4x}{4x^2-4x-8}$$

$$= \frac{8(x^2-2x+4)}{2x(x^3+8)} \cdot \frac{x(x^2-4)}{4(x^2-x-2)}$$

$$= \frac{8(\cancel{x^2-2x+4})}{\cancel{2}x(\cancel{x+2})(\cancel{x^2-2x+4})} \cdot \frac{\cancel{x}(\cancel{x+2})(\cancel{x-2})}{4(\cancel{x-2})(x+1)} = \frac{\cancel{8}\cancel{x}}{\cancel{8}x(x+1)} = \boxed{\frac{1}{x+1}}$$

### 6.3: Addition and Subtraction of Rational Expressions

Add to Homework List:

6.3/# 23, 27, 31, 29, 33, 35, 37, 39

Multiplication:  $\frac{3}{5} \cdot \frac{4}{5} = \boxed{\frac{12}{25}}$

Addition:  $\frac{3}{5} + \frac{4}{5} = \frac{3+4}{5} = \boxed{\frac{7}{5}}$

Addition (different denominators):  $\frac{3}{5} + \frac{2}{7}$   
 $= \frac{3}{5} \left( \frac{7}{7} \right) + \frac{2}{7} \left( \frac{5}{5} \right)$   
 $= \frac{21}{35} + \frac{10}{35} = \frac{21+10}{35} = \boxed{\frac{31}{35}}$

Least Common Denominator (LCD): 35

Ex:  $\frac{1}{6x} + \frac{7}{6x} = \frac{1+7}{6x} = \frac{\cancel{6}}{\cancel{6}x} = \boxed{\frac{4}{3x}}$

Ex:  $\frac{3}{x+5} - \frac{10}{x+5} = \frac{3-10}{x+5} = \boxed{\frac{-7}{x+5}} = \boxed{-\frac{7}{x+5}}$   
 more common way to write it  
 Both are correct.

Ex:  $\frac{4x}{x+1} + \frac{x+3}{x+1}$   
 $= \frac{4x+x+3}{x+1} = \boxed{\frac{5x+3}{x+1}}$

Ex:  $\frac{3y-5}{y+4} - \frac{5y-7}{y+4}$   
 $= \frac{3y-5}{y+4} + \frac{-(5y-7)}{y+4} = \frac{3y-5}{y+4} + \frac{-5y+7}{y+4}$   
 $= \frac{3y-5-5y+7}{y+4} = \boxed{\frac{-2y+2}{y+4}} = \boxed{\frac{-2(y-1)}{y+4}}$

(careful!) Not correct  $\rightarrow \frac{-2y+2}{y+4}$  is this  $\frac{-2y+2}{y+4}$  or  $-\frac{2y+2}{y+4}$   
 $\hookrightarrow \frac{-2y-2}{y+4}$

# Examples that do not already have a common denominator

Ex.:  $\frac{7x}{30} - \frac{11x}{12}$

LCD: 60

$$\frac{7x}{30} \left( \frac{2}{2} \right) + \frac{-11x}{12} \left( \frac{5}{5} \right)$$

$$\frac{14x}{60} + \frac{-55x}{60} = \frac{14x - 55x}{60} = \boxed{\frac{-41x}{60}} = \boxed{-\frac{41x}{60}}$$

Both are correct

Ex.:  $\frac{5y}{6x^2} - \frac{y}{4x}$

LCD:  $12x^2$

$$= \frac{5y}{6x^2} \left( \frac{2}{2} \right) + \frac{-y}{4x} \left( \frac{3x}{3x} \right)$$

$$= \frac{10y}{12x^2} + \frac{-3xy}{12x^2} = \boxed{\frac{10y - 3xy}{12x^2}} = \boxed{\frac{y(10 - 3x)}{12x^2}}$$

Both correct

Ex.:  $\frac{6}{x-4} + \frac{x+1}{4-x}$

Notice these do not have a common denominator!

$$= \frac{6}{x-4} + \frac{x+1}{4-x} \left( \frac{-1}{-1} \right)$$

$$= \frac{6}{x-4} + \frac{-x-1}{-4+x} = \frac{6}{x-4} + \frac{-x-1}{x-4}$$

$$= \frac{6-x-1}{x-4} = \boxed{\frac{5-x}{x-4}} = \frac{-1(x-5)}{x-4}$$

$$= \boxed{-\frac{x-5}{x-4}}$$

Ex.:  $\frac{2x}{x-8} - \frac{1}{x}$

LCD:  $x(x-8)$

$$= \frac{2x}{x-8} \left( \frac{x}{x} \right) + \frac{-1}{x} \left( \frac{x-8}{x-8} \right)$$

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

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

Ex.:  $\frac{3}{x-3} - \frac{6}{x+5}$

LCD:  $(x-3)(x+5)$

$$= \frac{3}{x-3} \left( \frac{x+5}{x+5} \right) + \frac{-6}{x+5} \left( \frac{x-3}{x-3} \right)$$

$$= \frac{3x + 15 - 6x + 18}{(x-3)(x+5)} = \boxed{\frac{-3x + 33}{(x-3)(x+5)}}$$

$$= \boxed{\frac{-3(x-11)}{(x-3)(x+5)}}$$