

Quiz tomorrow...

- Radical Equations
- Understanding absolute value  $|3-10|=7$   
 $|7|=7$
- Simplifying rational expressions, identifying restrictions
- Multiplying and dividing rational expressions
- Adding and subtracting rational expressions

Solve the following...  $\sqrt{3x+1}-\sqrt{x+4}=1$

$$\left(\sqrt{3x+1}\right)^2 = \left(1 + \sqrt{x+4}\right)^2$$

$$3x+1 = 1 + 2\sqrt{x+4} + x+4$$

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

$$\frac{2x-4}{2} = \frac{2\sqrt{x+4}}{2}$$

$$(x-2)^2 = (\sqrt{x+4})^2$$

$$x^2 - 4x + 4 = x + 4$$

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

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

$$x = 0 \text{ or } x = 5$$

Extraneous  
Root

$$\sqrt{3x+1}-\sqrt{x+4}=1$$

Verify:

$$\begin{array}{r|l} x=0 & \leq 5 \\ \sqrt{1}-\sqrt{4} & \leq 5 \\ 1-2 & \\ =-1 & \end{array} \quad \begin{array}{l} \leq 5 \\ | \\ \end{array}$$

$\mathbb{Q} \neq \mathbb{R}$

$$\begin{array}{r|l} x=5 & \\ \sqrt{16}-\sqrt{9} & \\ 4-3 & \\ 1 & \end{array} \quad \begin{array}{l} | \\ \leq 5 \\ \end{array}$$

11.  $\frac{x-3}{5}$  m/min.



$$d = st$$

$$d = \frac{x-3}{5} \frac{m}{\text{min}} \cdot 1h \times 60 \frac{\text{min}}{h}$$

$$d = \frac{(x-3)60}{5}$$

$$d = 12(x-3) m$$

# Chapter 6

## Determine the LCD

Use the pen tool to check the box that represents the lowest common denominator for the group of rational expressions listed. Click on **Check** to check your work.

1.  $\frac{16}{3(x+2)}, \frac{4}{3x}$  **Check**

- $3(x+2)$       $9(x+2)$   
  $3x(x+2)$       $9x$

2.  $\frac{3}{5x}, \frac{7}{x}, \frac{x}{x+5}$  **Check**

- $5x^2 + 25$       $5x(x+5)$   
  $x(x+5)$       $x^2(x+5)$

3.  $\frac{2}{x(x-4)}, \frac{12}{x^2-2x-8}$  **Check**    4.  $\frac{2}{x}, \frac{1}{x^2(x+3)}, \frac{x}{x+3}$  **Check**

- $x(x-4)^2$       $(x-4)(x+2)$   
  $x^2(x-4)^2$       $x(x-4)(x+2)$

- $x+3$       $x$   
  $x^2(x+3)$       $x(x+3)^2$

5.  $\frac{2}{x^2+12x+36}, \frac{12x}{x^2-36}$  **Check**

- $(x+6)^2(x-6)$       $(x+6)(x-6)$   
  $(x+6)(x+6)$       $(x-6)^2(x+6)^2$

$\frac{2}{(x+6)^2}$      $\frac{12x}{(x+6)(x-6)}$

Sample problem with monomial denominators...

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

$$\frac{7a}{3a^2b} + \frac{4b}{6ab^4}$$

The LCD is  $6a^2b^4$ . We will then build up each fraction

See if this solution makes sense:

Simplify first

$$\frac{7}{3ab} + \frac{2}{3ab^3}$$

$$\left(\frac{2b^3}{2b^3}\right) \frac{7a}{3a^2b} + \frac{4b}{6ab^4} \left(\frac{a}{a}\right)$$

Multiply first fraction by  $2b^3$  and second by  $a$

$$\frac{14ab^3}{6a^2b^4} + \frac{4ab}{6a^2b^4}$$

Add numerators, no like terms to combine

$$\frac{14ab^3 + 4ab}{6a^2b^4}$$

Factor numerator

$$\frac{4}{15} + \frac{1}{15} = \frac{5}{15}$$

$$\frac{2ab(7b^3 + 2)}{6a^2b^4}$$

Reduce, dividing out factors 2,  $a$ , and  $b$

$$\frac{7b^3 + 2}{3ab^3}$$

Our Solution

You could have chose to reduce the rational expressions BEFORE finding common denominator...

Let's try a couple more examples using monomial denominators that require finding a common denominator...

$$\begin{aligned} & \frac{2}{3a^3} - \frac{5a}{2b} \\ \xrightarrow{\times 2b} & \frac{2(2b)}{6a^3b} - \frac{5a(3a^3)}{6a^3b} \\ & \frac{4b - 15a^4}{6a^3b} \end{aligned}$$

$$\begin{aligned} & \frac{a+4}{3a} + \frac{2a-1}{5a^2} \\ & = \frac{5a(a+4) + 3(2a-1)}{15a^2} \\ & = \frac{5a^2 + 20a + 6a - 3}{15a^2} \\ & = \frac{5a^2 + 26a - 3}{15a^2} \end{aligned}$$

What if the denominators are not monomials???

$$\frac{2}{x-2} - \frac{5}{x+8}$$

$$\frac{2(x+8)}{(x-2)(x+8)} - \frac{5(x-2)}{(x-2)(x+8)}$$

$$\frac{2x+16-5x+10}{(x-2)(x+8)}$$

$$= \frac{-3x+26}{(x-2)(x+8)}$$

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

$$\frac{4}{(x-4)(x+4)} + \frac{3}{(x+4)(x+4)}$$

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

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

$$\frac{4x+16+3x-12}{(x-4)(x+4)^2}$$

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

Remember to ALWAYS factor everywhere possible FIRST!!!

$$\frac{2}{w} - \frac{3}{w-1} + \frac{2}{w+2}$$

$$\frac{2(w-1)(w+2) - 3w(w+2) + 2w(w-1)}{w(w-1)(w+2)}$$

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

$$\frac{2w^2 + 2w - 4 - 3w^2 - 6w + 2w^2 - 2w}{w(w-1)(w+2)}$$

$$= \frac{w^2 - 6w - 4}{w(w-1)(w+2)}$$

$$\begin{aligned} & \xrightarrow{(y-2)(y+2)} \frac{4}{y^2-4} - \frac{2}{y+2} \\ &= \frac{4 - 2(y-2)}{(y-2)(y+2)} \end{aligned}$$

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

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

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

Practice Problems...

Page 336 - 339

#1, 3, 5, 6, 7, 8,